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Mobile Learning for Informal Learning and Continuing Professional Development in Australian Healthcare Environments: The Status of Nursing

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Abstract

Continuing professional development (CPD) is mandatory for maintaining registration as a health professional in Australia. This learning can be undertaken using a variety of methods including face-to-face, blended and online modes. This flexibility in learning enables nurses opportunities to undertake formal and informal CPD while at the workplace. Learning, while undertaking nursing practice supports knowledge and skill acquisition. As one-third of undergraduate nursing programmes include work integrated learning where registered nurses supervise undergraduate nurses while they are in practice in healthcare environments, it is imperative that nurses are contemporary in their own practice. Nurses are advocates for patients and as frontline health professionals, promote patient-centred care and participatory health that includes health promotion and patient education. Undertaking CPD and informal learning ensures nurses are capable to deliver safe and effective healthcare.

The growth of mobile technology for leisure and learning has changed how individuals seek and retrieve information, interact, collaborate and share information. Over time the advent of the smartphone, coupled with access to 'apps', reduced costs of hardware and data and increased Internet speed has enabled mobile technology for learning and teaching in healthcare environments to become attractive to nurse supervisors, undergraduate nurses and patients while at the workplace. The opportunity to seek and retrieve information in real-time as an adjunct to traditional learning strategies is appealing because it can be conducted at point of care and include the patient in their own care, if it is appropriate to do so. Additionally, nurse supervisors can harness 'learning moments' at the bedside with students by using digital media to clarify or reinforce concepts. Nurses can also confer or check information prior to making healthcare decisions without leaving the patient. There is no longer a wait for a desktop computer to be available at a nurses' station or need to look up information after a shift concludes. This real-time access and use of mobile learning in healthcare environments challenges traditional learning and teaching paradigms and threatens the *status quo*, where previously learning was conducted in the classroom, nurses' station or occasionally at point of care. Using mobile technology for learning in Australian healthcare environments is currently *ad hoc* and conducted with minimal direction from peak health profession bodies. The lack of clear guidance at a systems and organisation level has led to confusion about safe and appropriate use of mobile technology for learning and teaching, informal learning or CPD by nurses, at an individual level in the workplace.

The global milieu reported regarding the use of mobile or portable devices for learning and teaching showed there was a gap in knowledge that needed addressing if mobile learning is to become a legitimate nursing function. This research aimed to develop a comprehensive understanding of the nature and scope of usability of mobile learning at point of care in Australian healthcare environments. The aim of the research was to understand:

> *The nature and scope of usability of mobile learning in situ, at point of care, by registered nurse supervisors and undergraduate nurses, for learning and teaching, informal learning or continuing professional development in healthcare environments.*

From this aim, the two research questions developed. These questions were:

> *RQ1: What factors have contributed to the limited acceptance of mobile learning, using mobile or portable devices, by nurses in healthcare environments?*
>
> *RQ2: What is the impact of current governance structures on mobile learning in situ, at point of care?*

These questions each had two further research objectives:

> *RQ1 RO1: To understand the nature and scope of usability of mobile learning in situ, at point of care, by registered nurse supervisors for learning and teaching, informal learning or continuing professional development in healthcare environments?*

RQ1 RO2: To understand the nature and scope of usability of mobile learning in situ, at point of care, by undergraduate nurses, for learning and teaching, informal learning or continuing professional development in healthcare environments?

RQ2 RO1: To understand how mobile learning at point of care is governed at a systems level?

RQ2 RO2: To understand the organisation impact on governance of mobile learning at point of care?

Understanding the nature and scope of usability of mobile learning at point of care in Australian healthcare environments from different perspectives was the primary aim because current information was fragmented or unavailable. These questions and objectives provided direction for the research design and multiple small projects to elicit the nature and scope of usability of mobile learning at point of care. To capture the current situation, a systems framework was used to describe interrelationships and patterns within the whole domain of interest, and the research was conducted in two phases. Using systems theory within a pragmatic approach, Phase 1 focused on an individual level. Phase 2 of the research focused on organisations and systems levels and how this impacted mobile learning at an individual level.

Phase 1 provided quantitative and qualitative information from nurse supervisors and undergraduate nurses in two Australian states. Each of the four studies in this phase contributed to understanding the research domain from an individual level perspective. Both nurse supervisors and undergraduate nurses reported there were barriers, challenges, risks and benefits of using mobile technology at point of care. The main findings were nurses in Australian healthcare environments (New South Wales and Tasmania) are unable to access mobile technology for learning and teaching as a legitimate nursing function. A range of factors precluded its use as an adjunct method of learning and teaching. Reasons included higher education institution, organisation or local policy that prohibited its use, reported lack of proficiency and confidence of nurses in safe and appropriate use, fear of inadvertent inappropriate use, dissuasion by peers and resistance by some nurses. Nurse supervisors and undergraduate nurses that participated in these studies reported they understood the risks and benefits of using mobile devices at the workplace. Participants voiced their frustration of the mobile learning paradox, whereby there is an inability of nurses to access mobile learning, while it is increasingly being recognised that using mobile technology has the potential to improve patient outcomes. Furthermore, the development of digital professionalism as part of professional identity formation was hindered because safe and appropriate use of mobile or portable devices was not being modelled during work integrated learning. Additionally, nursing students reported that nurse supervisors needed to be upskilled in understanding the capacity of mobile learning at point of care. The final part of Phase 1 using a triad model, demonstrated how mobile learning could be deployed in healthcare environments to empower learners and transform learning at point of care.

Phase 2 of the research focused on how governance structures at an organisation and systems level impacted mobile learning at an individual level. Analysis of the current nursing standards and codes of conduct found they provided inadequate direction without reform. Revision to overtly describe how mobile learning can be safely and appropriately used is necessary to legitimise the use of mobile or portable devices to advance nursing practice. The final interview study used interpretive description to uncover factors influencing the use of mobile technology for informal learning and CPD from the perspective of nursing profession organisations. Phase 2 demonstrated there was reluctance by nurses within these organisations to advance protocols that legitimise digital professionalism and the use of mobile learning. The outcomes of this research suggest that nurses need to challenge the *status quo* and lead development of installing mobile learning as a legitimate nursing function at the workplace. Strategies to support this stance at a systems level include ensuring nurses are included in informatics decision-making at a National level. Appropriate governance at a systems level will enable organisation and individual change, which will be of benefit to nurse supervisors, nursing students and patients.

A synthesis of the findings of the studies conducted in phases 1 and 2 enabled a comprehensive understanding of the research domain. This research found the growth of mobile technology has impacted the advancement of nursing practice. This research is presented as eleven –peer reviewed publications, one under review and one manuscript ready for submission, will contribute to enabling a standardised approach to embedding mobile learning as a legitimate nursing function at point of care,

within Australian healthcare environments. Further research needs to be conducted to provide evidence that mobile learning at point of care can be undertaken when it is safe and appropriate to do so. Trialling for usability of mobile technology for informal learning and CPD is warranted. Furthermore, evidence to support the development of standards, guidelines and policies regarding using mobile learning at point of care are necessary to ensure workarounds and unintended consequences are identified prior to installation of this adjunct learning and teaching strategy.

Mobile technology connects end-users in ways that were previously unachievable. Information transfer and digital knowledge management has become ubiquitous in the environment. If nurses are to remain contemporary in their field there is an expectation they will harness the benefits of mobile learning while managing the barriers, risks and challenges. Nurse leaders are vested with stewardship of enabling mobile learning to become installed in healthcare environments as a legitimate nursing function.

Statements and Declarations

Declaration of Originality

This thesis contains no material which has been accepted for a degree or diploma by the University or any other institution, except by way of background information and duly acknowledged in the thesis, and to the best of my knowledge and belief no material previously published or written by another person except where due acknowledgement is made in the text of the thesis, nor does the thesis contain any material that infringes copyright.

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Statement of Ethical Conduct

The research associated with this thesis abides by the international and Australian codes on human and animal experimentation, the guidelines by the Australian Government's Office of the Gene Technology Regulator and the rulings of the Safety, Ethics and Institutional Biosafety Committees of the University.

Signed:

Date: 24/01/2018

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Contribution to authorship of publications

Key: Authors

CM: Carey Mather

EC: Elizabeth Cummings

FG: Fred Gale

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Paper	Concept and design	Planning and implementation	Data collection	Analysis and interpretation	Writing	Overall responsibility
1	CM, EC	CM	CM	CM	CM, EC	CM
2	CM, EC	CM	CM	CM, EC	CM, EC	CM
3	CM, EC	CM	CM	CM, EC	CM, EC	CM
4	CM, EC	CM	CM	CM, PA	CM, EC, PA	CM
5	CM, EC	CM	CM	CM, PA	CM, EC, PA	CM
6	CM, EC	CM	CM	CM	CM, EC	CM
7	CM, EC	CM	CM	CM, EC	CM, EC	CM
8	CM, EC	CM	CM	CM, EC	CM, EC	CM
9	CM, EC	CM	CM	CM, EC	CM, EC	CM
10	CM, EC	CM	CM	CM	CM, EC	CM
11	CM, FG, EC	CM	CM	CM, FG	CM, FG, EC	CM
12	CM, EC	CM	CM	CM, EC, FG	CM, EC, FG	CM
13	CM, EC	CM	CM	CM, EC	CM, EC, FG	CM

Chapter 2 - Paper 1

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Chapter 3 - Paper 2

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Chapter 3 - Paper 3

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Chapter 4 - Paper 4

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Chapter 4 - Paper 5

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Chapter 5 - Paper 6

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Chapter 5 - Paper 7

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Chapter 6 - Paper 8

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Chapter 6 - Paper 9

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Chapter 7 - Paper 10

Mather, C and Cummings, E, "Empowering learners: Using a triad model to promote eHealth literacy and transform learning at point of care", *Knowledge Management & E-Learning*, **7** (4) pp. 629-645. ISSN 2073-7904 (2015).

Chapter 8 - Paper 11

Mather, CA and Gale, F and Cummings, EA, "Governing mobile technology use for continuing professional development in the Australian nursing profession", *BMC Nursing*, **16** pp. 1-11. doi:10.1186/s12912-017-0212-8 ISSN 1472-6955 (2017).

Chapter 9 - Paper 12

Ready for submission for peer review for publication to BMC Nursing:

Mather, C, Cummings EA and Gale, F. "Understanding organisation impact on mobile learning by nurses in Australian Healthcare environments".

Chapter 10 - Paper 13

This paper is currently under review for inclusion in the *Studies in Health Technology and Informatics* series as:

Mather, CA and Cummings, EA and Gale, F. "Mobile Learning in Nursing: Tales from the Profession".

We the undersigned agree with the above stated "proportion of work undertaken" for each of the above published (or submitted) peer-reviewed manuscripts contributing to this thesis:

Signed:

Associate Professor Elizabeth Cummings	Professor Nuala Byrne
Supervisor	Head of School
University of Tasmania	University of Tasmania

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Nemo sibi nascitur

No-one is born for self alone

(The Quaker Society of Friends' School motto, Hobart, Tasmania)

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I anticipate in the future that if any members of my family, spanning three generations, are recipients of healthcare, they will be attended by a nurse who can access mobile technology to seek and retrieve information as a legitimate nursing function.

Terminology

During the period taken to conduct the research of this dissertation, there were changes in terminology, which are reflected in the publications. It was important to remain contemporary in the field and as accepted terminology evolved, writing about these concepts and topics included the use of emerging or newly accepted terms.

Andragogy is a term frequently used in informatics to describe learner-focused opportunities among adult learners, whereas pedagogy generally refers to teacher-focused education.

Clinical supervisor was the term used at the outset of this research to describe nurses who precept, mentor or coach students in healthcare environments. This term has evolved in the nursing literature to become nurse supervisor. The term 'clinical' now depicts a 'helping' relationship between a health professional and qualified health clinician such as clinical psychologist. It can also include mentorship of a postgraduate mental health nurse seeking credentialing.

Continuing professional development is the means by which members of the profession maintain, improve and broaden their knowledge, expertise and competence, and develop personal and professional qualities required through their professional lives (Nursing and Midwifery Board of Australia 2013d).

Digital professionalism is a term used to describe the emergence of the need for health professionals to understand, develop and know appropriate professional behaviour when using digital media (Mather, Douglas & O'Brien 2017). There is currently no accepted or standard definition of this term (Bahr, Crampton & Domb 2017; Ellaway et al. 2015).

Informal learning is learning opportunities and enhanced social interaction among adult learners that enables nurses to collect, analyse and share data *in situ* across healthcare settings (Peters 2007; So, Kim & Looi 2008). Informal learning is a component of **continuing professional development** as learning can take place outside formal learning situations. Access to information in real-time has provided more opportunities for learning moments. Acknowledgement of the ability to access information using a mobile or portable device has enabled an increase in informal learning at point of care.

In situ or 'in position' was used to emphasise access to learning opportunities at the patient bedside. This term has been superseded with the phrase point of care.

Mobile learning, **m-learning or mlearning** refers specifically to learning and teaching interactions that use mobile or portable hand-held devices such as electronic notebooks, tablets or smartphones (Traxler 2007).

Nurse supervisor describes the relationship of those **registered nurse** clinicians who precept, mentor or coach undergraduate nurses while undertaking work integrated learning in healthcare settings and supersedes the term **clinical supervisor**.

Patient is used throughout this research to describe consumers of healthcare services. These persons may be also be known as clients or customers depending on the healthcare environment, however, the term **patient** is used for consistency within this dissertation.

Point of care is used to describe activities that are undertaken at the bedside in healthcare environments where previously these activities may have occurred in a laboratory, treatment room, nurses' station or away from the patient.

Registered nurses are known as **nurse supervisors** when they supervise students or other nurses for learning and teaching activities.

Workaround is an informatics term used to describe behaviour that develops as a response to overcoming a problem.

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Chapter 1 Introduction

Historia est vitae magistra

History is the tutor of life

(Marcus Tullius Cicero)

This dissertation with publications investigated the nature and scope of usability of mobile learning at point of care by registered nurse supervisors and undergraduate nurses for informal learning and CPD. To understand the complexity of the research domain, mobile learning was investigated by applying systems theory at the individual, organisation and systems levels. This method of stratification enabled the barriers, risks, challenges and benefits of mobile learning in healthcare environments in two Australian states to be revealed. A pragmatic approach underpins the research where multiple small studies were undertaken to gain a comprehensive understanding of the nexus of nursing, mobile technology and mobile learning.

This chapter provides an overview of the dissertation. It introduces the research domain and provides a synopsis of nursing, mobile technology and mobile learning from a global perspective. Next, the research aim, questions and objectives are described to show how the research was conducted. The research contributions are included as a summary within the remaining chapters of the dissertation. This chapter is divided into the following sections:

- Section 1.1 provides an overview of content and context of the research domain of nursing, mobile technology and mobile learning from a global perspective. It highlights the gap in knowledge about this topic within healthcare contexts by investigating two Australian states;
- Section 1.2 describes the research aim, questions and objectives developed to guide the research design;
- Section 1.3 outlines the approach to the research, explaining why it was conducted in two phases;
- Section 1.4 provides a statement about the literature, explaining how it is embedded within the body of the publications and manuscripts; and
- Section 1.5 presents a summary of each of the publications and manuscripts, highlighting the research contributions in each of the remaining chapters.

1.1 Overview of context

The rapid growth in the use of social media and mobile technologies has challenged the *status quo* within healthcare environments at an individual, organisation and systems level (Senge 1990). Current methods and strategies of operation within these environments are no longer valid. In response to advancements in digital technology there needs to be planning for policy development to support education, and foster cultural change towards technology use by healthcare professionals. This is evident within the discipline of nursing where technological advances to enhance seeking and retrieval of information for clinical, administrative, research or learning purposes has not kept pace with current trends. Nurses in Australian healthcare environments report they are unable to legitimately access and use mobile technology at point of care for informal learning and CPD (Mather, Marlow & Cummings 2013).

Informatics in nursing is not new. Silva (1973) discussed the need for nurses to be involved with the development of health informatics. She realised that models of practice and learning would change as technology advanced. Research in nursing informatics developed during the 1980s (Saba &

McCormick 1986). During the 2000s studies of the use of personal digital assistants (PDAs) were undertaken in healthcare environments (Mickan et al. 2013). Wireless technology enabled easier, less costly access to the Internet and simultaneous development of smartphones with media capabilities further increased the penetration of mobile technology (Pauleen et al. 2015). Research and evaluation of informatics for clinical and administrative purposes burgeoned. Sharples and colleagues (2007) and others (So, Kim & Looi 2008; Strandell-Laine et al. 2015) investigated the convergence of mobile technology and education. Additionally, Gray and colleagues (2014) and others (Hegney et al. 2007; Mackay, Anderson & Harding 2017; Raman 2015) explored the nexus of nursing and mobile technology. The International Council of Nurses (International Council of Nurses 2009) acknowledged a global approach towards nursing informatics was required and the Technology Informatics Guiding Education Reform (TIGER) emerged in Europe (Honey et al. 2017). The development of Australian nursing informatics competency standards (Borycki et al. 2013) began, as did discussion regarding professionalism when using mobile technology (Ellaway et al. 2015; Gholami-Kordkheili, Wild & Strech 2013). Concurrently, research into the use of social media and Web 2.0 technology within healthcare environments emerged (Arrigoni et al. 2016; Green 2017; McBride, LeVasseur & Li 2013; Wilson et al. 2014). Authors continue to predict the future of the ubiquitous use of mobile technology in healthcare environments (Risling 2017; Roberts & Williams 2017).

Although using mobile technology is ubiquitous and nursing and mobile technology is being researched, there continues to be a lack of acknowledgement of the complexity of the implementation of new work practices (Fixsen et al. 2005). While nurses in two Australian states cannot legitimately seek and retrieve information in real-time, the advancement of nursing practice will be hindered. Empowerment of nurses to become proficient and effective in the use of digital technologies is necessary to enable organisations that do allow mobile learning to flourish Using mobile technology for learning and teaching in healthcare environments in two Australian states continues to be a missed opportunity to transform nursing practice. There needs to be parallel development of social etiquette or 'netiquette' modelled at an individual level to promote professional conduct and structural empowerment within organisations that enable harnessing of the potential of developing learning organisations as expressed by Senge (1990).. The overarching rationale for ensuring healthcare professionals are conversant with social media, mobile technologies and mobile learning is to enable safe, effective and high quality care to patients and clients with the aim or improving health outcomes.

Australian research explored the needs of nurse supervisors (Mather, Marlow & Cummings 2013) and use of digital technology for learning and teaching by student nurses (Mather, Cummings & Allen 2013) and was the impetus for exploring the use of mobile learning in healthcare environments. The findings of these different projects suggested that healthcare workers were being denied access to digital technology that could advance learning and teaching, nursing practice and improve patient outcomes. These previous studies also found that although mobile technology is ubiquitous in the environment, healthcare professionals, especially nurses are disadvantaged because outdated policies and guidelines precluded its use within healthcare settings. Access to mobile technology in Australian healthcare environments in two Australian states is *ad hoc* and dependant on healthcare setting, 'local culture' or manager influence. Findings from one project (Mather, Marlow & Cummings 2013) found nurse supervisors were actively dissuaded from using mobile technology at the workplace. Earlier research (Mather 2011) indicated that students had knowledge deficits about using digital technology that impacted their ability to understand or use digital technology while undertaking work integrated learning. There was realisation there were content and context issues about digital technologies where information was lacking at individual, organisation and systems levels. By exploring the perspectives of nurse supervisors and nursing students a more complete understanding of the barriers, challenges, risks and benefits at the individual, organisation and systems level for learning and teaching at point of care could be understood. The findings could inform policy development about mobile technology to ensure safe, effective and high quality care could be delivered to patients by nurses.

Critique of current literature and reports of past studies provided opportunities to gain an understanding of the complex of factors that contribute to the barriers, challenges, risks and benefits of mobile learning at an individual, organisation and systems level in healthcare environments. These

layers are interconnected and impact the role and function of individuals, organisations and at a systems level. Additionally, the ability to use mobile learning *in situ,* at point of care is multi-factorial. It requires synergy of the human, equipment, physical and social environment (Runyan 1998) to enable safe, effective and efficient care. If facets within these layers are unbalanced, the flow of using mobile learning is stifled. Past research indicates mobile learning is currently limited in healthcare environments. This conundrum led to the research presented in this dissertation.

1.2 Research aim and research questions

The aim of this research was to gain an wholistic understanding of what creates the limits of acceptance of mobile learning for nurse supervisors and students. The aim was:

> *To understand the nature and scope of usability of mobile learning in situ, at point of care, by registered nurse supervisors and undergraduate nurses, for learning and teaching, informal learning or continuing professional development in healthcare environments?*

The research that forms this dissertation explores the complexity of the Australian healthcare environment in an effort to understand the lack of acceptance of mobile technology and how Australian governance structures have impacted mobile learning by nurses, at point of care. Additionally, policy development and promotion of digital professionalism as part of professional identity formation would benefit from evidence of how mobile learning is used for learning and teaching, informal learning or CPD by nurse supervisors. The preferred use of mobile learning at point of care in the future, by those participating in work integrated learning would assist with guiding future direction about the installation of mobile learning at point of care. The findings of this research can be used to guide policy development about access and use of mobile learning during work integrated learning and for informal learning and CPD, at point of care.

Why are nurses unable to use mobile learning for informal learning and CPD at point of care in healthcare environments? Current literature and previous studies undertaken globally enabled an insight into the complex of factors that contribute to the barriers, challenges, risks and benefits of mobile learning at an individual, organisation and systems level. Past studies reported on the use of mobile or portable devices for decision-making or administration. However, there were gaps regarding formal learning and teaching, informal learning and continuing professional development. The absence of capacity for nurse supervisors and undergraduate nurses to access mobile or portable devices for learning in Australia led to the development of the research questions. However, during the research study design, it became apparent there was a need to separate end-user factors from other factors, which guided the development of two research questions to answer the aim.

> *RQ1: What factors have contributed to the limited acceptance of mobile learning, using mobile or portable devices, by nurses in healthcare environments?*
>
> *RQ2: What is the impact of current governance structures on mobile learning in situ, at point of care?*

The first research question focused on the individual level of nurse supervisors and undergraduate nurses and research objectives (RO) for research question 1 became:

> *RQ1 RO1: To understand the nature and scope of usability of mobile learning in situ, at point of care, by registered nurse supervisors for learning and teaching, informal learning or continuing professional development in healthcare environments?*
>
> *RQ1 RO2: To understand the nature and scope of usability of mobile learning in situ, at point of care, by undergraduate nurses, for learning and teaching, informal learning or continuing professional development in healthcare environments?*

Research objectives for exploring research question 2 focused on how organisations and systems levels impacted the individual level:

RQ2 RO1: To understand how mobile learning at point of care is governed at a systems level?

RQ2 RO2: To understand the organisation impact on governance of mobile learning at point of care?

Separation of the research question into two parts enabled the nature and scope of usability to be clearly identified at an individual level. Additionally, by understanding the impact of usability from an organisation and systems level provided a comprehensive view of the research domain. Synthesis of the findings was designed to provide a detailed understanding of the topic.

This dissertation with publications includes 13 publications. Eleven articles have been peer-reviewed and published (presented in Chapters 2-8); one article is prepared for submission (Chapter 9); and one is under review (Chapter 10). Research question 1 was predominantly answered during Phase 1, comprising Chapters 3-7, and Chapters 8-9 present Phase 2, which contributes to answering research question 2 of the research. There was overlap of the research questions within the studies as the individual level was impacted by the organisation and systems level factors. The complexity within, and linkage between levels benefitted from clarification by introducing two research objectives within each question. Each study focused on answering the research questions, however, the use of research objectives provided emphasis to enable the research questions to be answered wholistically. The use of research objectives also enabled the complexity of the levels to be shown. Each objective in research question 1 addressed how specific end-users within the individual level understood mobile learning. The impact on the activity of mobile learning from an organisation and systems level was the focus of research question 2. This layered approach revealed how mobile learning for informal learning and CPD was understood by nurses in healthcare environments in two Australian states. Table 1 shows the study group focus in relation to the systems theory level within the research questions and objectives.

Table 1. Research questions and objectives by study group and systems theory level

Chapter number	Publication number	Study group	Focus of systems theory level	Research question	Research objective
Overview of the research domain					
2	1	Nurses and nursing students	Individual, organisation and systems	1	1 & 2
Phase 1					
3	2	Nurse supervisors	Individual	1	1
3	3	Nurse supervisors	Individual	1	1
4	4	Nursing students	Individual	1	2
4	5	Nursing students	Individual	1	2
5	6	Nurse supervisors	Individual, organisation and systems	1 2	1 2
5	7	Nursing students	Individual, organisation and systems	1 2	2 2
6	8	Nurse supervisors	Individual	1	1
6	9	Nurse supervisors	Organisation and systems	2	2
7	10	Nurse supervisors, nursing students and patients	Individual	1	1 & 2
Phase 2					
8	11	Registered Nurse profession	Organisation and systems	2	1
9	12	Nursing profession organisations	Organisation and systems	2	2
10	13	Nurse supervisors, nursing students, and nursing profession organisations	Individual, organisation and systems	1 2	1 & 2 1 & 2

1.3 Approach to the research

A mixed method approach was undertaken to gain an in-depth understanding of the subject explored (Creswell & Garrett 2008). Multiple small studies were conducted to gain an wholistic perspective of the research domain. A pragmatic paradigm (Creswell et al. 2003) that incorporated realist evaluation (Salter & Kothari 2014) was the philosophical stance employed for the purpose of understanding the current nature and scope of usability of mobile learning by nurses in healthcare environments. The use of a pragmatic approach acknowledges the duality of subjectivity and objectivity necessary for investigating the topic. This approach was undertaken because it allows for inter-subjectivity rather than complete objectivity or subjectivity sought by adopting only one perspective. The design process led to this position because the pragmatic philosophy enabled the research problem to be the focus of study (Creswell et al. 2003). Dewey's concept of inquiry provides further impetus for use in this research as it emphasises the human experience that is contextual, emotional and social (Dewey 2008; Morgan 2014). Additionally, this method of inquiry accepts the continuous connection of beliefs and actions that are cyclical, rather than a linear process (Morgan 2014). This philosophy is an active process of inquiry that requires constant reflection to consider the nature of the problem and likely effects of solution. Dewey's approach to inquiry involved five steps. These are:

1. Recognising a problem;
2. Considering how to define the problem in a particular way rather than choose another manner;
3. Developing a response to the issue;
4. Evaluating the response with regard to potential consequences; and
5. Responding in a way that can ameliorate the problem (Morgan 2014; Parvaiz, Mufti & Wahab 2016).

This philosophical lens permitted survey research and interpretive description methods to answer the research questions. A materials and methods section was included in each publication, rendering a methods chapter unnecessary.

Data collection was sequential to explore the current circumstances of mobile learning by nurses, in Australian healthcare environments. Multiple small research projects were conducted to investigate the research domain from different perspectives and these are outlined in Table 2. This table also presents the timeline of the research, focus of study (participants and context) and methods used to collect data. Chapter and publication numbers are also included to enable the reader to situate the research within the context of the dissertation and publication order. Scrutiny of this table shows how pragmatism was used to explore the topic. As the research progressed, barriers, challenges, risks and benefits were revealed that warranted further investigation. Within this framework, surveys, focus group and individual interview methods were used to consider, evaluate and explore amelioration of the problem.

Table 2. Summary of studies undertaken

Chapter Number	Publication Number	Method	Study group	Focus of systems theory level	Ethics approval number	Date of study	Date of publication
Overview of the research domain							
2	1	Literature review with three case study examples	Nurses and nursing students	Individual, organisation and systems		2014	2014
Phase 1							
3	2	Online questionnaire	Nurse supervisors	Individual	H0012527	2014	2014
3	3	Online questionnaire	Nurse supervisors	Individual	H0012527	2014	2014
4	4	Online questionnaire	Nursing students	Individual	H0013729	2014	2015

Chapter Number	Publication Number	Method	Study group	Focus of systems theory level	Ethics approval number	Date of study	Date of publication
4	5	Online questionnaire	Nursing students	Individual	H0013729	2014	2015
5	6	Focus group 1	Nurse supervisors	Individual, organisation and systems	H0013729	2014	2015
5	7	Online questionnaire	Nursing students	Individual, organisation and systems	H0013729	2014	2016
6	8	Focus group 1	Nurse supervisors	Individual	H0013729	2014	2017
6	9	Focus group 2	Nurse supervisors	Organisation and systems	H0013729	2015	2017
7	10	Model and use case scenario	Nurse supervisors, nursing students and patients	Individual	H0016097	2015	2015
Phase 2							
8	11	Literature review	Registered Nurse profession	Organisation and systems	H0016097	2016	2017
9	12	Individual interviews	Nursing profession organisations	Organisation and systems	H0016097	2017	Ready for submission
10	13	Mixed methods	Nurse supervisors, nursing students, and nursing profession organisations	Individual, organisation and systems	H0012527 H0013729 H0016097	2014-2017	Under review

The growth of mobile technology use has led to a situation where Australian nurses at the workplace are precluded from deploying a tool that could support informal learning and CPD to advance nursing practice. This nexus of nursing, mobile technology and learning has become a complex of contributing factors which, due to historical circumstances, have become inextricably linked, and have led to the current situation. The publications in this dissertation present answers to the research objectives. The studies were designed to address the research questions from the perspectives of nurse supervisors and undergraduate nurses. Other viewpoints have been gleaned from published work of others. The published articles explored the nature and scope of the current situation about using mobile learning in Australian healthcare environments as viewed by nurse supervisors and nursing students. Chapters 2-10 demonstrate that mobile learning as a new andragogy for learning and teaching in healthcare environments, is hindered by a range of contributing factors at individual, organisation and systems levels.

Senge (1990) describes a system as a group of cohesive interrelated and interdependent parts that can be natural or human-generated. A systems framework in this context is used to describe the complex nature and scope of the research domain – that is nurses, nurse supervisors and undergraduate students in healthcare environments, who at an individual level are influenced and impacted by social and physical environments. These organisation and systems levels are also influenced and impacted by factors within the individual level of actors, in this case they were the nurses, nurse supervisors and undergraduate students. Changes within levels have the capacity to affect other parts evoking expected and unintended consequences. The systems approach offers a framework to describe the interrelationships and patterns of the whole research domain. The framework is used to describe the interrelationship and patterns that emerged from this research.

The exploration was conducted in two phases. Phase 1 focused on end-users also known as the individual level and Phase 2 predominantly investigated factors at an organisation and systems levels. Phase 1 involved probing, examining and analysing the contributing factors, then synthesis of the characteristics found, to gain an wholistic understanding of the individual level. Nurse supervisors and undergraduate nurses were the focus of this enquiry. Patients as recipients of care were included as they form an integral part of using mobile technology at point of care in healthcare environments.

Nurse supervisors are committed to learning and teaching. To maintain their nursing registration each year, they must meet mandated CPD requirements. As such, investigating how these nurses managed their CPD was within this research domain. Additionally, it is these registered nurses that are vested with the responsibility of supporting and guiding undergraduate nurses during work integrated learning. Nurse supervisors promote learning and teaching at the workplace. Understanding their capacity to harness mobile technology for learning and teaching purposes with nurses, students and patients was within the research domain. Exploring how nursing students understood current nursing practice related to mobile technology within healthcare environments provided further dimension to the research domain. Understanding undergraduate nurses' preferred perspectives provided further insights into how mobile learning at an individual level could be installed to advance nursing practice.

Analysis of studies of nurse supervisor and student perspectives indicated digital professionalism was a component of professional identity formation, which was impeded by a lack of governance. Additionally, a model and use case scenario was developed to show how the research domain could function when the concept of mobile learning was integrated into healthcare environments. The findings presented in Chapters 2-7 form Phase 1 of the research and predominantly answer research question 1.

Phase 2 focused on the impact of mobile learning at an organisation and systems level in healthcare environments. Phase 2 focused on the organisation and systems level issues and how they impact nurses at the individual level. The current Registered Nurse Standards for Practice and Codes of Professional Conduct were analysed in relation to mobile technology for learning. Next, individual interviews with representatives from nursing profession organisations to explore the impact of governance structures from their perspective were conducted. Synthesis of Phases 1 and 2 about using mobile technology for mobile learning at individual, organisation and systems levels and implications for nursing in Australian healthcare environments was undertaken to gain a comprehensive understanding of the research domain.

1.4 Statement about the literature

To minimise repetition, there is no substantive literature review provided in this dissertation, as relevant literature is included within the body of each of the publications. A synopsis of the literature is provided in 'Overview of the Context', which traces the historical development and prior research about the evolution of nursing informatics and mobile learning from an international perspective. The literature included is comprehensive and pertains to the specific focus of each manuscript. The first publication in Chapter 2 provides an overview of the literature relating to the development of the Australian digital environment of social media and mobile technology and this nexus with CPD of nurses. Chapter 3 introduces literature relating to governance of workforce development in Australia and presents the current situation of nurse supervisors and mobile technology in healthcare environments. The literature included in the third publication incorporates information relating to the usability of digital technology to support workforce development of nurse supervisors. Chapter 4 includes literature related to governance of using or accessing mobile technology in healthcare environments and to nurse and student learning at point of care. The literature embedded in publications 6 and 7 and presented in Chapter 5 includes an overview of andragogies used during work integrated learning, including mobile learning. These publications also provide information about professional identity development of nurses and includes previous studies that outline the barriers, challenges, risks and benefits of using mobile technology at point of care. The capability of digital knowledge transfer by nurse supervisors is the focus of both publications that comprise

Chapter 6. The literature from publication 10, embedded in Chapter 7 includes information about health and ehealth literacy, and how this topic relates to mobile learning. This publication also provides background information about health education and promotion by nurses, that impact on the use of mobile learning at point of care.

Phase 2 begins with Chapter 8, which is an analysis of the current governance of mobile technology with the Registered Nurse Standards for Practice and Codes of Professional Conduct in nursing. The publication outlines potential reforms to enable implementation of mobile learning using mobile technology at point of care. Chapter 9 provides an analysis of nursing professional organisation perspectives on mobile learning and mobile technology. Chapter 10 presents publication 13, which is a synthesis of the research domain. Conclusions from the research form the final section of this chapter.

1.5 Structure of the dissertation

1.5.1 Chapter 2

Understanding the research domain is the focus of Chapter 2, which provides the background and context about the concepts of interest explored in this dissertation. The first publication outlines past research, how this knowledge informs and contributes to the known literature about the topic of interest. Past research is situated within the broader healthcare context to demonstrate the barriers, challenges, risks and benefits found prior to the systematic approach undertaken of this study to understand the relationship of nurses, mobile learning and workplace. The aim of this chapter was to describe the participants targeted and healthcare environments used to explore the nature and scope of the research domain. The first published article *Nurses using social media and mobile technology for continuing professional development* reviewed the literature about current Australian ehealth and mobile health legislation, professional body Web 2.0 policies and guidelines on healthcare organisations. It demonstrated using three case studies how mobile learning can be used for informal learning and CPD in healthcare settings.

1.5.2 Chapter 3

The second publication presented as the first part of Chapter 3, entitled *Mobile learning: A workforce development strategy for nurse supervisors* describes the inhibitors and opportunities of using digital technology for workforce development and CPD of clinical supervisors. It argues policy development and cultural change regarding digital technology have the potential to support a flexible and collaborative approach to workforce development of nurses. The second publication in this chapter, *Usability of a virtual community of practice for workforce development of clinical supervisors* is an example of a collaborative digital strategy to support workforce development of nurse supervisors. It describes a learning and teaching innovation to support participation of clinical supervisors in a virtual community of practice. The purpose of the studies were to understand nurse supervisor perspectives on whether upskilling and modelling the use of digital technology was useful as a workforce development strategy and for informal learning and continuing professional development.

1.5.3 Chapter 4

Two publications comprise Chapter 4, which describes the student perspective of using mobile or portable devices for learning at point of care. Current knowledge, skills, attitudes and behaviour are outlined and discussed in *Nurses' use of mobile devices to access information in health care environments in Australia: A survey of undergraduate nurses*. The current literature about the use of mobile or portable devices and social media technology in healthcare settings by nurses was mixed. Exploring the current use of mobile or portable devices for learning and teaching by undergraduate nurses at point of care in Australia was required for triangulation with information collected about nurse supervisors' use of mobile or portable devices. The second publication focuses on *Undergraduate Nurses' Preferred Use of Mobile Devices in Healthcare Settings*. This publication

reports the findings of a survey study to gain an understanding about the use and access of mobile or portable devices by undergraduate nurses at and away from the workplace. It builds on previous work about current access and use by nurse supervisors and students. The purpose of this study was to provide information about future expectations of undergraduate students about using mobile devices for learning and teaching at point of care. This chapter provides understanding of the undergraduate nurses' perspective about using mobile devices for learning in healthcare environments in two Australian states.

1.5.4 Chapter 5

The complexity of the research domain is shown by two publications, which form Chapter 5. *Unveiling the mobile learning paradox* describes the findings of a qualitative methodology that builds on the previous evaluation research undertaken with nurse supervisors. There is a shift in focus in this publication from the use of digital technology to exploring the domain of mobile learning. This study reported on the deeper understanding about governance issues impacting the usability of mobile learning at the workplace. The second publication *Issues for deployment of mobile learning by nurses in Australian healthcare* settings focuses on the lens of undergraduate nurses. This publication describes perceived opportunities and barriers to using mobile devices during work integrated learning as described by student nurses. Enabling access and professionalism issues were two key themes that emerged and discussed within this chapter.

1.5.5 Chapter 6

Nurse supervisors understand rationales for using mobile or portable technology for informal learning and CPD in the workplace. The first publication in Chapter 6 *Modelling digital knowledge transfer: nurse supervisors transforming learning at point of care to advance nursing practice* reports the theme *expanding knowledge,* emergent from the first focus group study. Three sub-themes consisting of *evidence of learning*, *digital literacy* and *access* enabled emergence of the *expanding knowledge* theme. These participants also acknowledged that using mobile technology at point of care for learning and teaching was a lesser priority than access, as ingress to information is currently blocked, and knowledge cannot be created using this strategy in the majority of their workplaces. The second publication *Moving past exploration and adoption: Considering priorities for implementing mobile learning by nurses*, reports on the analysis of the focus group study of nurse supervisors who participated in the previous research (Table 2). This later study sought priorities for action from participants. These publications demonstrate that nurse supervisors understand the changing learning and teaching environment to incorporate digital knowledge transfer. Nurse supervisors would like to ensure they remain contemporary in their field by modelling mobile learning at point of care and being capable of promoting digital knowledge transfer to nursing students and patients. Incorporation of mobile learning to augment learning and teaching opportunities is evident from the responses of participants. The nurse supervisors indicated that changes at a systems level was a priority to enable implementation of mobile learning as a strategy to support informal learning and CPD in the workplace.

1.5.6 Chapter 7

Chapter 7 presents the publication *Using a triad model to promote eHealth literacy and transform learning at point of care,* which proposes a model of mobile learning of students and patients with nurse supervisors. A use case scenario shows how mobile learning can be incorporated into nursing practice to promote patient education and enhance end-user or patient outcomes. It is a synthesis of the previous chapters to demonstrate how mobile learning has the capacity to transform learning at point of care and the nurse-patient relationship to improve health outcomes and advance nursing practice.

1.5.7 Chapter 8

Phase 2 of the research begins with Chapter 8, which presents the publication *Governing mobile technology use for continuing professional development in the Australian nursing profession*. This publication addresses the current governance issues relating to the use of mobile technology for mobile learning in Australian healthcare environments. It demonstrates how lack of acknowledgement of mobile technology use in the Nursing and Midwifery Board of Australia Registered Nurse Standards for Practice and Codes of Professional Conduct of nurses impacts digital and ehealth literacy and use of Web 2.0 for nursing in healthcare environments.

1.5.8 Chapter 9

Chapter 9 presents an article prepared for submission titled *Mobile learning in Australian healthcare environments: Nursing profession organisation perspectives and leadership challenges*. This manuscript describes the findings of interviews with representatives from nursing professional bodies or nurses that hold professional portfolios within professional nursing organisations at a systems level. It critiques the current understanding of organisation governance about mobile learning in healthcare settings for the purpose of understanding usability and utilisation of mobile learning at an individual level. This study was an exploration of impact and potential for change in current nursing practice in healthcare organisations and was conducted by interviewing key nursing representatives in Australia.

1.5.9 Chapter 10

Phases 1 and 2 are synthesised and presented in Chapter 10. An article under review titled *Mobile learning in nursing: Tales from the Profession* is also presented. This article draws on the studies undertaken within this dissertation to demonstrate the complexity of mobile learning by nurses within healthcare environments in Australia. This chapter then includes a conclusion section with segments describing future directions and recommendations for enabling implementation of mobile learning at point of care by nurses in healthcare environments in Australia.

Chapter 2 Understanding the research domain

Tamdiu discendum est, quamdiu vivas

We should learn as long as we may live

(Lucius Annaeus Seneca the Elder)

The focus of Chapter 2 is to provide an overview to the research and present the context of the research domain of nursing, mobile technology and mobile learning in Australia. Understanding the research domain enables the reader to gain an understanding of the Australian context where this research is situated. This chapter explores the use of digital technologies as a platform and the development of mobile learning as a strategy for CPD of nurses. Demonstrating opportunities for harnessing digital technology to enable learning within the context of healthcare environments or the workplace. The publication presented here provides an overview of the current situation of using social media and digital technologies for CPD, which is the focus of study in this research. This chapter is divided into three sections:

- Section 2.1 provides an introduction to publication 1, which details the Australian context of nursing and the nexus with mobile technology;
- Section 2.2 presents publication 1 - *Nurses Using Social Media and Mobile Technology for Continuing Professional Development: Case Studies from Australia*; and
- Section 2.3 provides commentary on Chapter 2, and how this chapter contributes to answering the research questions.

2.1 Introduction to publication 1

Nursing students spend over 800 hours or more than one-third of their Bachelor of Nursing degree in healthcare environments undertaking nursing practice known as work integrated learning (Mather & Marlow 2012). Developing the capability to link theory with practice and grasping nursing concepts within this environment is essential for preparation of students to become novice registered nurses. Learning and teaching within the workplace is guided and supported by registered nurse supervisors. Gaining an understanding of University requirements and nurse supervisor expectations of support, guidance and access to University resources is varied. It became apparent there was a need to understand better, the needs of the clinicians that were guiding and supporting undergraduate nurses during work integrated learning. To understand the requirements of organisations and individual nurse supervisors a needs assessment survey was conducted (Mather 2010). Communication between nurse supervisors and the University was identified as key for promoting high quality professional experience placements for students.

2.1.1 Nursing and technology

Student nurses integrate newly acquired knowledge, skills, attitudes and behaviours during nursing practice. Work integrated learning is undertaken to immerse students in the professional culture of nursing and enable development of professional identity. Student nurses need to be supported and guided by nurse supervisors who are able to demonstrate competence in this role. Nurse supervisors also require support in undertaking this supervisory role of students. For successful introduction of mobile learning platforms, nurses must first acquire the necessary information, communication and technology programme skills.

As the pace for contemporary information increases and new information is rapidly available, there is a demand for health professionals to filter information, and also demonstrate maintenance of currency in their area of specialisation. Growth and commercialisation within the fields of digital technology is occurring more rapidly than educators from the health sciences or education fields can innovate within the curriculum before further advances render it is superseded. As such nurse supervisors need to develop the capability to ensure student nurses were educationally prepared and work ready at completion of their undergraduate nursing degree.

An evaluation of the implementation of an e-portfolio into the experiential environment of a foundation unit of a Bachelor of Nursing programme in Australia was undertaken during 2010 (Mather 2011). The study provided valuable insights and uncovered assumptions about user understanding about digital media use. This study was conducted across four campuses in two states of Australia. Students were allocated to approximately 250 placement agencies that included a range of healthcare environments. These were tertiary and district acute care services in hospitals, residential aged care facilities, multipurpose health centres, general practice surgeries and community based health service settings. Organisations took one or up to 60 students depending on its size and the capacity to provide high quality supervision experience for students.

Prior to implementation of the technology there was the development of a range of learner supports, including face-to-face tutorials, web conferencing, media vignettes, narrated slide presentations, a user manual and fact sheets. Technical support was also provided prior and during the implementation phase. The findings indicated the assumption that students could utilise learning and teaching software was flawed. Furthermore, the notion that students had a base-line understanding of computing and software terminology was ill-founded. Although the use of computers is ubiquitous in the environment, it became apparent that although students used digital media for a variety of uses, it did not translate into understanding about the purpose of an e-portfolio.

2.1.2 The nexus of nursing and mobile technology

The publication titled *Nurses using social media and mobile technology for continuing professional development* explores and demonstrates the changing healthcare and education landscape. The challenge of incorporating mandated/legislated educational requirements for maintaining a nursing registration within the context of Australian healthcare environments shows the unintended consequences and impact of the growth of technology on healthcare providers, service provision and individuals. Three diverse case studies using examples from original research are used to show that advances in technology can be harnessed and included to promote or assist with meeting the requirements for registration. Concerns and limitations of using this new technology and andragogy for CPD within healthcare settings is explored. The future of using these technological advancements within healthcare environments and how healthcare professionals, organisations and patients can benefit. External pressures associated with the embedding of digital technologies and necessity for CPD will create impetus for a change in culture within the nursing profession to incorporate novel or innovative strategies for meeting the annual CPD requirements.

The publication scoped the current literature and provides context for the topic of this dissertation. Understanding and defining key terminology used to describe ehealth; social media; and m-health became apparent, as there remains no standardised terminology to describe these terms, which hinders dialogue and mutual understanding of digital technology, within and between healthcare professionals and other disciplines situated within healthcare.

This publication describes the evolution of using new technology within the nursing profession and healthcare environments, and demonstrates the potential of integrating CPD into everyday nursing activities as informal learning. It provides the reader with an overview of the requirements for maintaining registration as a nurse within Australia, and how CPD can be undertaken using digital technology. Case studies are used to demonstrate there are opportunities for nurses to obtain CPD that do not use traditional andragogical strategies such as face-to-face workshops or activity-based online courses. It challenges readers to consider the potential and impact of using this new andragogy as an adjunct method for maintaining registration as a nurse. It provides examples of how digital

technologies can be used for accessing or participating in content development and recording informal or formal CPD activities as evidence. New opportunities for undertaking CPD have not yet been realised and further developments in policy and cultural change will be required for acceptance mobile learning for CPD of nurses. The potential of using social media and mobile technology as a strategy for CPD of nurses is highlighted. The future of mobile learning for informal learning and CPD in nursing including barriers, are also acknowledged. The conclusion provides direction for future possibilities and suggests strategies for achieving the aim of embedding mobile technology for CPD within healthcare settings.

2.2 Publication 1 - Nurses using Social Media and Mobile Technology for Continuing Professional Development: case studies from Australia

Mather, C and Cummings, E, "Nurses Using Social Media and Mobile Technology for Continuing Professional Development: Case Studies from Australia", *Social Media and Mobile Technologies for Healthcare, Medical Information Science Reference*, M Househ, E Borycki and A Kushniruk (ed), United States, pp. 147-172. ISBN 978-1-4666-6150-9 (2014).

Chapter 2.2 has been removed for copyright or proprietary reasons.

2.3 Commentary on Chapter 2

An understanding of the background to the research domain of nursing, mobile technology and mobile learning is presented in Chapter 2. The first publication describes the research domain and presents current literature detailing the background about nurses, mobile technology and mobile learning in relation to informal learning and CPD. While the aim of the publication was to describe the current situation regarding the nexus of the research domain, it provides evidence to support both research questions.

> *RQ1: What factors have contributed to the limited acceptance of mobile learning, using mobile or portable devices, by nurses in healthcare environments?*

Exploratory studies have been undertaken in other countries and past research in Australia described through case studies reports the current *ad hoc* approach to incorporating informatics and mobile technology into learning and teaching for nurse supervisors and undergraduate nurses in Australian healthcare environments. It also outlines the current governance of nursing in Australia, which assists with understanding the importance of research question 2 in this study.

> *RQ2: What is the impact of current governance structures on mobile learning in situ, at point of care?*

This chapter indicates that governance of using mobile technology has not kept pace in healthcare environments, which is the focus of research question 2. The publication concludes by stating that social media and mobile technologies will be limited by the pace of acceptance by health professionals and regulatory bodies, which is the focus of this body of research.

Chapter 3 Mobile learning and nurse supervisors

Vivat, crescat, floreat!

May he/she/it live, grow, and flourish!

(Unknown)

Nurse supervisors are the focus of this chapter, which describes how mobile technology can be used to advance nursing practice. It discusses how mobile technology can be harnessed as a workforce development strategy, demonstrating how mobile technology can be used for learning and teaching of nurse supervisors in healthcare environments. The research also highlighted that although these nurses were aware of the benefits of mobile learning at the workplace, they also reported there were issues that needed to be overcome if this andragogy was to become embedded as a legitimate nursing function. Emphasis of the complexity of the research domain is revealed by this chapter. Knowledge gaps in using informatics by nurse supervisors was acknowledged as reducing proficiency in modelling mobile learning to others. Upskilling nurse supervisors about safe and appropriate use of mobile technology to enable modelling of digital professionalism to peers, other learners and patients is warranted. This chapter is divided into the following sections:

- Section 3.1 provides an introduction to publication 2, which demonstrates mobile learning could be used as a workforce development strategy;
- Section 3.2 presents publication 2 - *Mobile learning: A workforce development strategy for nurse supervisors*;
- Section 3.3 provides an introduction to publication 3, which demonstrates how a virtual community of practice can improve digital literacy, increase connectivity at a local and global level enabling workforce development of nurse supervisors;
- Section 3.4 presents publication 3 - *Usability of a virtual community of practice for workforce development of clinical supervisors*; and
- Section 3.5 provides a commentary on Chapter 3 and how it contributes to answering research objective 1 of research question 1.

3.1 Introduction to publication 2

Exploration of the use of digital media by registered nurses who are supervisors of undergraduate nurses in a range of healthcare settings was the focus of this study. This publication shows how mobile learning can be used to promote workforce development of nurses within the workplace. Participants completed an online survey about their understanding of Web 2.0 technology. It builds on the previous work and further explores potential inhibitors and opportunities at an individual, organisation and systems level. Furthermore, it expands on the cultural change required to accept embedding of this new andragogy within the workplace. Modelling safe and appropriate use of mobile technology is raised as a strategy to promote development of the professional identity of nurses. This individual approach has the capacity to create the cultural shift necessary at an organisation or systems level to enable mobile learning to become the norm for augmenting learning by nurses in healthcare settings. The importance of policy development at an organisation and systems level to support the change in culture to include mobile learning recurs. This publication acknowledged there was a need to provide opportunity for nurse supervisors to gain confidence and skills to promote mobile learning during work integrated learning so that students and patients can be provided with opportunities to develop digital literacy.

3.2 Publication 2 - Mobile learning: A workforce development strategy for nurse supervisors

Mather, C and Cummings, E, "Mobile learning: A workforce development strategy for nurse supervisors", *Studies in Health Technology and Informatics*, **204** pp. 98-103. doi:10.3233/978-1-61499-427-5-98 ISSN 0926-9630 (2014).

Abstract

Digital technology provides opportunities for using mobile learning strategies in health care environments. To realise the vision of the National Workforce Development Strategy there needs to be innovation of health professionals to further develop knowledge and skills of clinical supervisors to access and gain an understanding of the value of mobile learning at the workplace. The use of digital technology by clinical supervisors was explored in 2012 as part of a teaching development grant to evaluate the use of Web 2.0 technology to develop a community of practice about clinical supervision. Prior to developing the virtual network of clinical supervisors, feedback about the use of Web 2.0 technology by clinicians was sought via an online survey. Over 90% of respondents used social media, 85% understood what a blog and wiki were and approximately half of the respondents used smart phones. More than one-third indicated they would participate in a virtual community of practice and would like to receive information about clinical facilitation at least once per week. Findings indicate both inhibitors and opportunities for workforce development within health care environments that need to be addressed. Support of graduate-ready nurses can be achieved through an integrated outlook that enables health professionals within organisations to undertake mobile learning *in situ.* A flexible and collaborative approach to continuing professional development within organisations could enhance practice development and could positively impact on workforce development.

Key words: mlearning; clinical supervision; digital technology, work integrated learning.

Introduction

The emergence and growth of digital technology in health care and education has created opportunities for learning and teaching that extend beyond traditional boundaries (Abbott & Coenen 2008; Hegney et al. 2007; Smedley 2005; While & Dewsberry 2011). The rapid change in modes of health care delivery and communication presents challenges and solutions that were outlined in the Australian National E-Health Strategy. It identified that a health workforce skilled in information communication technology (ICT) was a key area for driving change and adoption (Australian Health Ministers' Conference 2008). The Australian Workforce Development Discussion paper (Australian Workforce and Productivity Agency 2012) forecast there could be strong increases in employment within professional occupations and registered nurses were identified to lead employment growth across all four projected scenarios described in the Paper. The Paper revealed the expectation of skills deepening will be required in the health sector. It also outlined the recognition of innovation driven by leadership and management skills, was desirable. To meet this aim consideration of a holistic three-pronged approach was suggested. It included the need to ensure continuing professional development is relevant, high quality, collaborative and flexible (Australian Workforce and Productivity Agency 2012).

Work integrated learning (WIL) enables theory to inform work practice within formal curriculum or co-curricular activities to prepare for work readiness. Importantly, the Strategy outlined the imperative for creative and effective use of ICT in learning and teaching (L&T) and the need to improve digital literacy (Australian Workforce and Productivity Agency 2012). Exploring the use of digital technology has provided information that can be used to develop innovations in mobile learning (mlearning) within the workplace that can assist with realising the vision of the Workforce Development Strategy (Australian Workforce and Productivity Agency 2012).

Literature indicates that ICT literacy among health professionals, especially nurses is mixed (Abbott & Coenen 2008; Bembridge, Levett-Jones & Yeun-Sim Jeong 2011; Borycki et al. 2013; Hegney et

al. 2007; Levett-Jones et al. 2010; Smedley 2005; While & Dewsberry 2011; Wilson et al. 2014). Hegney et al (2007) recommended promotion of ICT literacy and workforce development strategies that have resulted in changes to ensure health professionals become more digitally literate. The Australian Health Practitioner Regulation Agency (AHPRA) (2013) has mandated continuing professional development of its members and the Nursing and Midwifery Accreditation Council (ANMAC) (2012) now requires ICT competency to be included in all undergraduate nursing programs. Educational programs need to meet the demand for improving digital literacy by developing opportunities and minimising inhibitors to learning in the workplace.

Sharples, Taylor and Vavoula (2005) offered a framework for theorising about mlearning which described the convergence between learning and technology and noted that it was the learner that is mobile, rather than the technology; the learning is interwoven with other activities; it can be distributed across a range of learners, teachers, resources and technologies. Importantly, Sharples et al (2005) indicated context is constructivist as learners build knowledge through interacting with their environment. The co-evolution of L&T has implications for the development of a new mobile approach at the workplace that could encourage life-long learning and strengthen workforce development opportunities.

Research undertaken during 2009 to determine the needs of organisations that support undergraduate student nurses during WIL indicated that supervising clinicians employed by organisations would like more support and guidance from the University (Mather 2010). The study also found they would like to be informed about contemporary nursing and supervision issues. There was also a desire by supervisors to be aligned with University guidelines relating to students and WIL and be informed of updates. Clinical supervisors within organisations also indicated they would like to develop stronger partnerships with each other (Mather 2010). A need to explore the knowledge, skills, behaviour and attitudes of nurses to facilitate support and guidance was identified. A grant to evaluate an intervention to support clinical supervisors in practice was successful. The aim of this cross-sectional study was to investigate the use of digital technology and literacy of clinical supervisors.

Methods

An online questionnaire was developed to gather data about digital media use by clinical supervisors who supervised undergraduate nursing students at this University. Recruitment of respondents was through direct contact before, or at one of seven workshops conducted as part of a project to facilitate a community of practice for clinical supervisors. Descriptive analysis was conducted using Microsoft Excel (Version 14.2.5). A minimal risk ethics application was approved (H12527).

Results

There was a high recruitment rate to the survey with 27 (N=34) respondents completing the entire survey and a further seven partial completions (n=34). Demographic data were analysed for the complete data set. Incomplete surveys were excluded from the digital use analysis.

Demographically, 66% of respondents were aged over 46 years, and 90% were female. In relation to their roles more than half (52%) were nurse educators or clinical supervisors. The majority of respondents (59%) had mentored nursing students for more than five years, and only 10% for less than one year. Participants were from a range of facilities including: tertiary (38%), primary care (24%), or residential aged care (12%), with the majority (72%) being from regional and rural areas.

Of the respondents (n=27) that completed the digital use section of the survey 93% indicated they had been using a computer and the Internet for more than five years. One respondent indicated they had used a computer or the Internet less than two years and one respondent did not answer. Of the participants 52% indicated they owned a smart phone and 44% indicated they had purchased applications. Fifty-six per cent also reported they owned an iTunes account and over 70% indicated they owned a Skype account.

Ninety-three per cent of participants used social media such as Facebook, Twitter, Google+ and LinkdIn. Two-thirds (67%) indicated Google+ was their most preferred method of networked social

media, while only 18% used Facebook; 11% used Twitter and nil reported using LinkedIn. The second preference was Facebook 67%; Google+ and LinkedIn (11%); and Twitter (7%). Twitter (41%) was the most preferred third choice with LinkedIn (37%) and the remainder did not answer, suggesting they did not use these Web 2.0 platforms. Over 56% indicated they used YouTube less than once per month; 30% used YouTube between one and three times per month or once per week; and 15% used YouTube more than twice per week and up to two or three times per day.

Respondents were asked a series of questions regarding their understanding of Web 2.0 terminology. Eighty-five per cent provided a brief description of what is meant by the term blogging. Twenty-six per cent indicated they had tried blogging and only 16% had previously contributed to a wiki project.

Limitations

The small sample size precluded generalisability of the study. Respondents were self-selected and may have been innovators within their field. This cohort may have artificially increased the use of digital technology responses and skewed the results.

Discussion

The results indicate there are inhibitors and opportunities for workforce development of clinical supervisors. Although the number of respondents was low, the findings provided useful feedback about the demographics of the cohort who were initially involved with the implementation of the digital communication strategy. The age and gender profile of respondents mirrors the National average (Health Workforce Australia 2013b). The implications of this finding suggest there could be a generational difference impacting on the uptake of technology use by this cohort (Brunetto, Farr-Wharton & Shacklock 2012; Oblinger 2003). The majority of these senior clinicians indicated had been clinical supervisors for more than five years. They also indicated that they had used computers and the Internet for at least the same period. Therefore these clinicians are well positioned to be change champions (Senge 1990) to promote improvements in digital literacy through policy development, role modelling and L&T. There is an opportunity to support this endeavour to be contemporary in clinical supervision by using mlearning strategies (Edirippulige et al. 2012; Mather, Cummings & Allen 2013).

Potential inhibitors for workforce development

There are potential inhibitors for realisation of the vision of the workforce development strategy. The age of this cohort may inhibit the adoption of mlearning in the workplace because these clinicians are not ‘digital natives’ (Prensky 2001) and may not understand the value of enabling mlearning *in situ.* The lower than average uptake of smart phone use (Sharples, Taylor & Vavoula 2005) may further impede the acceptance of the Web 2.0 platforms that could enhance learning and continuing professional development at the workplace. These clinicians are used to accessing desktop-based digital technology, and may not fully understand the functionality of smart computers. Moreover, access to resources via a mobile device could be more appropriate or timely than access via a desktop computer away from the learning opportunity. This cohort indicated they did not regularly use YouTube. There is a growing body of literature (Azer et al. 2013; Clifton & Mann 2011) indicating that YouTube is becoming an accepted source of credible learning resources. This form of media may be an untapped resource for learning *in situ* or at point of care. The development and provision of guidance about access to appropriate and credible sites for use could be required. Again the age of the cohort may preclude the promotion of using YouTube media clips as an mlearning strategy for continuing professional development.

This cohort indicated the majority used social media. Clinical supervisors were found to prefer using Google+ in preference to Facebook. The use of a different platform from many of their peers may be an inhibitor for sharing of information or resources. LinkedIn was ranked lower than Twitter, suggesting it was not recognised for networking by these nurse leaders and may reduce their opportunity to network with other senior members within the health field.

Potential opportunities

The findings indicate there are potential opportunities for advancing the use of mlearning by clinical supervisors at the workplace. This cohort indicated almost half used a smart phone and were familiar with social media platforms. Respondents were familiar with purchasing applications. Harnessing and extending the understanding of Web 2.0 technologies by clinical supervisors could lead to gaining confidence in sharing and contributing to the community of practice, rather than only receiving information. By promoting the use of social media to exchange information among clinicians could assist to upskill their colleagues and model appropriate use of mobile technology. Furthermore, this process of diffusion of innovation (Rogers 1995) could enable adoption of mlearning strategies to other clinicians. Respondents indicated they used Skype for communication. This platform has the potential to link isolated or geographically dispersed practitioners in synchronous dialogue, whereas other asynchronous forms could be useful for part-time staff or shift workers. Respondents were familiar with blogs and wikis predominantly as 'lurkers' or non-participants. There is potential to engage clinicians to contribute to these forms of mlearning, which could strengthen networks within and between organisations and contribute to workforce development. The use of mlearning platforms may contribute to retention of staff and improve undergraduate completion rates as appropriate pedagogy can be attended during WIL through learning *in situ* (Australian Workforce and Productivity Agency 2012). Technology drives change (Australian Workforce and Productivity Agency 2012) and over time, the promotion of appropriate mlearning strategies in the workplace could create a cultural shift of acceptance of the use of mobile devices by registered nurses in health care settings. The increased connectivity may unlock productive potential of clinicians, improve quality of experience and enable mastery of digital technology use (Australian Workforce and Productivity Agency 2012) by clinical supervisors.

Future directions

Technology will influence workplaces of the future (Australian Workforce and Productivity Agency 2012). The results of this study indicate there is a need to focus on mlearning strategies, promote digital literacy and enable knowledge work of health professionals (Australian Workforce and Productivity Agency 2012). There is a need to provide opportunity for accessing mlearning strategies and sharing of information or resources in the workplace. The acceptance of using mobile technology *in situ* will facilitate the cultural shift required to prepare clinical supervisors for this innovative method of learning. To further this aim the development of codes of practice or conduct to guide acceptable behaviour while using mobile technology or mlearning in the workplace is imperative. Furthermore, upskilling of clinicians about appropriate conduct, so they can model behaviour at point of care is necessary. Lastly, the evaluation of the implementation of any mlearning code is required to ensure outcomes for patients and learners in the workplace are improved.

Conclusion

Changing skill requirements in health care settings have created new professional standards within the health professions. The availability of mlearning opportunities will ensure clinical supervisors remain leaders in their field. Modelling the use of mobile technology in the workplace will promote a desirable cultural shift towards appropriate and safe use by clinicians. Further research to investigate how mlearning can become embedded in the workplace will enable the development of robust policy that will ensure safe and appropriate use within health care environments.

3.3 Introduction to publication 3

While the focus of publication 2 was understanding how nurse supervisors use digital technology, the importance of the development of robust policy to underpin and support mobile learning at point of care was highlighted. Policy development about the safe and appropriate use of mobile technology is vital to guide and support nurse supervisors. This study indicated the lack of policy has inhibited

embedding mobile learning as a workforce development strategy and impeded opportunities to change culture to include using this new andragogy at point of care.

Publication 3 focused on the individual level and targeted the usability of a virtual community of practice as a workforce development strategy. It described perceptions of these nurse leaders at an individual level about their willingness to embrace new andragogy and technology. However, it showed the development of appropriate policy to support and guide clinicians is required to enable them to model digital professionalism and promote positive professional identity, about using mobile technology safely and appropriately to improve outcomes for learners and patients.

3.4 Publication 3 - Usability of a virtual community of practice for workforce development of clinical supervisors

Mather, C and Cummings, E, "Usability of a virtual community of practice for workforce development of clinical supervisors", *Studies in Health Technology and Informatics*, **204** pp. 104-109. doi:10.3233/978-1-61499-427-5-104 ISSN 0926-9630 (2014).

This publication was nominated for Best Student Academic/Scientific Paper - *Branko Cesnik Award: HISA Health Informatics Conference* (2014).

Abstract

Workplaces are being transformed by technological change. There is great potential for innovation at educational institutions and in the workplace. Creative and effective use of information communication technology in learning and teaching and for continuing professional development of health professionals is imperative. To determine the usability of a virtual community of practice for clinical supervisors, an online survey was administered prior to attendance at professional development workshops. Clinical supervisors were targeted because they were senior nurse leaders and could promote and model the use of the virtual network within their organisations. Survey findings indicated that a community of practice would be useful for communication about clinical supervision and obtaining information from the University. However, respondents were less certain they would share information by actively contributing to the public mobile learning resources. This study indicates there is considerable potential to build capacity of health care professionals through workforce development. Support for clinical supervisors to understand and use mobile learning strategies for continuing professional development and promote life-long learning can assist with realising the vision of the National Workforce Development Strategy.

Key words: community of practice; mobile learning; clinical supervision; digital technology, work integrated learning.

Introduction

The emergence and growth of digital technology in health care and education is well documented (Abbott & Coenen 2008; Mather 2010; Smedley 2005; While & Dewsberry 2011). Technological change has created innovative opportunities for learning and teaching (L&T) (Wenger, White & Smith 2009). In 2008 the Australian National E-Health Strategy identified that information communication technology (ICT) skills were an essential part of developing and maintaining a skilled health workforce (Australian Health Ministers' Conference 2008). However, the development and understanding of ICT literacy among health professionals, and more specifically nurses, is mixed (Abbott & Coenen 2008; Bembridge, Levett-Jones & Yeun-Sim Jeong 2011; Borycki et al. 2013; Smedley 2005; While & Dewsberry 2011; Wilson et al. 2014). Recently the Nursing and Midwifery Accreditation Council (Australian Nursing and Midwifery Accreditation Council 2012) has mandated ICT competency as a core component to be included in all undergraduate nursing programs.

Research was undertaken to increase understanding and explore the knowledge, skills, behaviour and attitudes of supervising nurses' use of social media with the aim of developing a virtual community of practice (CoP) about clinical supervision. The development of CoP and the emergence of digital habitats to support and guide participants in their area of interest has been discussed by researchers such as Wenger et al (2009) and Webb et al (2005). These authors identified the importance and value of professional learning initiatives to progress the transfer of professional learning into in-class practices. The work integrated learning (WIL) environment is similar to those described in the literature (Webb, Robertson & Fluck 2005; Wenger, White & Smith 2009) where there is a need to ensure that supervising clinicians are prepared for using the mobile learning opportunities available in the workplace for professional development and L&T. This publication describes the preparedness of a group of nurses to develop and engage with a CoP to support their supervision of student nurses during their work integrated practice in a range of health care environments.

Methods

A cohort of nurses, who clinically supervise undergraduate nursing students in practice, were administered an online survey prior to, or at one of seven workshops. These professional development sessions were conducted as part of a University funded project to facilitate the development of a CoP for clinical supervisors. Minimum risk ethics approval for this research was approved (H12527). Descriptive analysis was conducted using Microsoft Excel (Version 14).

Results

Twenty-seven complete responses were received from clinical supervisors who were employed in a variety of health care settings of which 72% were from rural and regional areas. More than one-third (38%) of respondents were employed at tertiary hospitals and almost half (48%) indicated their workplace was an out-of-hospital environment. More than half (59%) indicated they had mentored, preceptored or supervised Bachelor of Nursing students for more than five years; 21% for three to five years, 10% for one or two years and 10% for less than one year.

Table 3 indicates the beliefs of clinical supervisors about using digital technology as a mobile learning strategy for communication and continuing professional development at the workplace. The majority of supervisors believed they could learn to use digital technology (85%) so they could share information in a CoP. Respondents indicated that a virtual CoP would always or usually be useful for communicating effectively (74%) about clinical supervision; University information (71%) and for sharing information (70%) with colleagues in the network. Seventy-four per cent of respondents indicated they would join a CoP so they could communicate with the University and other clinical facilitators or supervisors. Almost three-quarters (70%) of this cohort indicated they would share using the micro blog. Respondents were less certain (41%) they would always or usually share information by actively contributing to the blog.

Table 4 shows the frequency of information desired about clinical facilitation and from the University. One-third of respondents indicated they would like to receive weekly information about clinical facilitation; while approximately 60% preferred to receive University information only as required.

Table 3. Beliefs about use of digital technology as a mobile learning strategy

N=27	Always	Usually	Sometimes	Never	No answer*
I believe that a clinical facilitator network or community or practice could enable me to communicate effectively with the University about University related information	30%	41%	11%	4%	15%
I believe that a clinical facilitator network or community of practice could enable me to communicate effectively with other clinical facilitators	37%	37%	11%	0%	15%

N=27	Always	Usually	Sometimes	Never	No answer*
I believe that I can learn to use the digital technology to enable me to share information with my colleagues in the community of practice and network with them about clinical facilitation issues.	44%	41%	0%	0%	15%
I believe that I will join the clinical facilitator network or community of practice so that I can communicate effectively with the University about University related information	37%	37%	11%	0%	15%
I believe that I will join the clinical facilitator network or community or practice so that I can communicate effectively with other clinical facilitators	44%	30%	11%	4%	11%
I believe that I will use digital technology to share information with my colleagues in the community of practice	37%	33%	15%	0%	15%
I believe I will share by using the SNM PEPCommunity blog comments section	15%	26%	33%	11%	15%
I believe I will share by using the @PEPCommunity community of practice site (Twitter) #PEPCommunity	11%	59%	37%	15%	15%

*May not equal 100% due to rounding.

Table 4. Frequency of information

N=27	At least once per week	At least once per fortnight	At least once per month	*Ad hoc*, as necessary	No answer*
How often would you like to receive information regarding clinical facilitation?	30%	19%	19%	19%	15%
How often would you like to receive information regarding the University and student information?	19%	15%	30%	59%	15%

*May not equal 100% due to rounding.

Respondents were asked a series of questions regarding their understanding of Web 2.0 terminology. Eighty-five per cent of respondents provided a brief description of what is meant by the term blogging. Twenty-six per cent indicated they had tried blogging themselves. Of those who responded to the question asking to briefly describe what is meant by the term wiki (85%), one respondent indicated "No idea (but will google it immediately!)", however only 16% had previously contributed to a wiki project. Ninety-three per cent of respondents that completed the digital use section of the survey indicated they had been using a computer and the Internet for more than five years. One respondent indicated they had used a computer or the Internet less than two years and one respondent did not answer.

Qualitative information supported the Likert scale responses. Responses indicated there was recognition for the need to learn about mobile learning opportunities for L&T; the ease of access mobile technology afforded in the workplace; and the availability of appropriate mobile learning resources by using Web 2.0 platforms. Supervisors recognised the need to up-skill, commenting:

> *"Internet, University website, typing speed and proficiency, medical and legal databases, education specific resource and materials"*

were required, to be an effective member of the network. When asked about their perception of using digital technology as part of the CoP responses included:

> *"I strongly believe that using information technology to enhance our communicative channels would be great";*

"I would like to be able to 'tap in' to a site where I could learn from other facilitators experiences"; and

"Being able to keep in touch with students for the duration of the placement, keep in touch with UTAS colleagues, access information about the placement and acting as a facilitator".

When asked what information they hoped a network would make available to them. Respondents indicated:

"Pertinent and succinct information that is easy to use and relevant to my needs";

"communication with other facilitators and 24hr, 7day access to resources; and "peer support".

Discussion

The findings of this study have implications for the usability of a virtual CoP as a strategy for workforce development of clinical supervisors in health care environments.

Although the number of respondents was low, the feedback about the cohort initially involved with the implementation of the digital communication strategy indicated the age and gender profile of respondents was similar to the National average (Health Workforce Australia 2013b). This finding suggests there could be a generational differences that could negatively impact on the usability of a CoP (Brunetto, Farr-Wharton & Shacklock 2012; Oblinger 2003). However, respondents indicated they were aware of the need be digitally literate, so they could build capacity by enhancing the student experience. Comments also indicated they could understand the value of being connected with their colleagues. Almost three quarters of respondents were from regional or rural areas, and a quarter indicated the main focus of their workplace was a primary health environment. The virtuality of the CoP meant that practitioners who are geographically dispersed or isolated could remain connected with their peers. Approximately half of this cohort identified as nurse educators and more than half had preceptored students for more than five years. Their L&T expertise could increase the usability of the CoP as these senior nurse leaders could guide and mentor less experience clinical supervisors.

More than three-quarters of respondents were enthusiastic in their support of the development of a virtual CoP. Respondents indicated they would always or usually use the digital network for receiving University or clinical supervision information. They also believed they would join the virtual CoP to enable effective communication and sharing of information among colleagues. When asked about using the dedicated blog and micro blog for communication within the CoP respondents were less certain. Approximately 70% of supervisors indicated they would use the micro blog, only 11% indicated they were committed to sharing via this method. Similarly, only 15% of respondents reported they would always use the blog. Conversely, respondents indicated they would be three times more likely to usually use the micro blog for sharing information than the blog. Questions related to seeking understanding about Web 2.0 terminology revealed that clinical supervisors were familiar with these, or were willing to learn. Approximately one quarter of respondents had contributed to wiki projects, which supports the belief that only some supervisors would consider contributing to the blog through the comments option. Additionally, the majority of clinical supervisors indicated they had used computers and the Internet for more than five years. The high level of engagement to share best practice through innovation of a virtual CoP indicates large scope for usability and building capacity within this group of clinicians. Conversely, there is potential for limiting the growth and sharing if supervisors continue or prefer to connect using other private electronic methods, such as email, which may exclude some members of the group and limit conversation.

Respondents indicated a preference to receive weekly information about clinical supervision and updates from the University as required. The desire for frequent and topical information demonstrated these senior clinicians were keen to remain updated and contemporary in their role. It increases the likelihood of their use of the CoP. The limitations of this study include the low number of complete

responses; self-selection; and respondents were part of a targeted group of clinical leaders interested in L&T at the workplace.

Technology drives change and these senior clinicians have demonstrated they are keen to engage in effective L&T communication strategies including joining a virtual CoP. Additionally, their beliefs about learning how to use digital technology to connect and share with their peers could build capacity to support their productive potential in the workplace. Further exploration of how clinical supervisors use information they receive via the CoP is warranted. Moreover, evaluation of this communication strategy as a method to build capacity of clinical supervisors that translates into improved quality of L&T of students in the workplace is necessary for informing design of workforce development opportunities. To support the promotion of a thriving virtual CoP within health care environments there will need to be the development of a code of conduct. The usability of mobile learning networks will only be effective when appropriate and robust policy is developed to guide and support clinicians to learn how to use digital technology *in situ*.

Conclusion

Clinical supervisors believed that a virtual CoP could improve communication and enable access to relevant and contemporary information about clinical supervision. Policy development regarding digital communication within health care organisations needs to be mindful of the benefits of information sharing within and between groups of clinicians that are employed within their facilities. The opportunity to develop sustainable support and guidance of clinical supervisors needs to be encouraged. It will enhance opportunities for building capacity and provide a safe, high quality clinical experience for students. Further research into developing and evaluating workforce development opportunities is required to guide policy direction about safe and appropriate use of mobile learning strategies. Over time, a supportive environment could facilitate cultural change and enable clinical supervisors to model appropriate behaviour to ensure improved outcomes for patients and learners in the workplace.

3.5 Commentary on Chapter 3

The importance of nurses as leaders for embedding social media and digital technology within healthcare environments was highlighted in this chapter. More specifically, nurse supervisors are the nexus between students and registered nurses and are vital for promoting and modelling mobile learning safely and appropriately. The concept of cultural change to enable the use of this new learning and teaching methodology at an individual level needs support through the development of policy at an organisation and systems level. The two publications demonstrate how mobile learning can be used as a workforce development strategy to promote CPD. Nurse supervisors are leaders in their field. They have the capability to build capacity of their colleagues and promote positive professional identity formation of their students. The development of a virtual community of practice supported these change champions to develop their ehealth literacy and model digital professionalism to their peers and with students. Professional identity formation is essential to ensure safe and appropriate use of mobile technologies is employed within healthcare settings and the development of policy is required to support this process. This chapter contributed to answering the research question objective from the registered nurse supervisor perspective:

> *RQ1 RO1: To understand the nature and scope of usability of mobile learning in situ, at point of care, by registered nurse supervisors for learning and teaching, informal learning or continuing professional development in healthcare environments?*

An overview of the current situation regarding the use and access of digital technology by nurses for CPD, informal learning and learning and teaching of undergraduate nurses demonstrates the complexity of the research domain from an individual level. Chapter 3 highlights mobile learning can be embedded as a new andragogy at the workplace. However, the research shows there was a gap in competency of nurse supervisors related to a complex of impediments including lack of policy to

promote safe and appropriate use of mobile learning for undertaking workforce development activities. Individual factors such as knowledge, skills and behaviour deficits contribute to impeding the development of digital leadership and modelling of digital professionalism necessary to promote acceptance of mobile learning within healthcare settings. Facilitation of high quality learning for undergraduate nurses requires that nurse supervisors learn how to support students and model using digital technology. Specific information about how nurse supervisors can use digital technology to learn, support and guide the next generation of nurses in safe and appropriate use was presented in this chapter. The development of policy to support embedding mobile learning is essential to progress this new andragogy and enable nurses to undertake CPD at the workplace. Synergy of policy and andragogy is required to progress the safe, effective and efficient use of mobile learning during work integrated learning. To understand the environment where mobile learning can take place, it is important to know and understand the current situation.

Chapter 4 Mobile technology and nursing students

Ad vitam Paramus

We are preparing for life

(Unknown)

The focus of this chapter is exploring undergraduate nurses' current and preferred use of digital technology at and away from the workplace. The student perspective regarding the use of mobile devices for work-, non-work and study-related activities in a range of healthcare settings is presented. Undergraduate nurses are the next generation of health professionals and they are well-placed to be educationally prepared for working within healthcare environments, where access to digital and health technology is ubiquitous for patient care, informal learning and their own CPD. Through the exchange of knowledge, skills, attitudes and behaviour within the workplace, student nurses have the capacity to introduce and enable diffusion of innovation, if there was policy to guide and support safe and appropriate use of mobile technology. Similarly, digital professionalism forms part of professional identity formation that can be modelled by their nurse supervisors. A cultural shift to accommodate utilisation of mobile learning during work integrated learning within workplaces can be achieved over time if students demonstrate they can use this andragogy safely and effectively to improve patient outcomes. This chapter is comprised of the following sections:

- Section 4.1 provides an introduction to publication 4 which reports on undergraduate nurses' current use of mobile or portable devices at an away from the workplace;
- Section 4.2 presents publication 4 - *Nurses' use of mobile devices to access information in health care environments in Australia: a survey of undergraduate students;*
- Section 4.3 provides an introduction to publication 5 which outlines undergraduate nurses' preferences for using mobile or portable devices at point of care;
- Section .4; presents publication 5 - *Undergraduate Nurses' Preferred Use of Mobile Devices in Healthcare Settings;* and
- Section 4.5 provides commentary on Chapter 4, and how it contributes to answering research objective 2 of research question 1.

4.1 Introduction to publication 4

The first publication in Chapter 4 is an analysis of student nurse reports of their current situation for using mobile devices. Undergraduate nurses are the registered nurses of the future. They are the next generation of healthcare professionals who will identify with the values and norms that uphold the profession of nursing. It is these students who are key to progression of introducing or implementing contemporary information and practices to promote safe, efficient and effective care to patients and contribute to improving health outcomes. This publication advances understanding of how mobile or portable devices are used to access information at and away from the workplace and identify differences in behaviour of student nurses in accessing information, using a mobile device when undertaking work integrated learning to other non-work situations.

4.2 Publication 4 - Nurses' use of mobile devices to access information in healthcare environments in Australia: A survey of undergraduate students

Mather, C and Cummings, E and Allen, P, "Nurses' use of mobile devices to access information in health care environments in Australia: a survey of undergraduate students", *JMIR mHealth uHealth*, **2** (4) Publication e56. doi:10.2196/mhealth.3467 ISSN 2291-5222 (2014).

Abstract

Background: The growth of digital technology has created challenges for safe and appropriate use of mobile or portable devices during work integrated learning (WIL) in health care environments. Personal and professional use of technology has outpaced the development of policy or codes of practice for guiding its use at the workplace. There is a perceived risk that portable devices may distract from provision of patient or client care if used by health professionals or students during employment or work integrated learning.

Objective: This study aimed to identify differences in behaviour of undergraduate nurses in accessing information, using a portable or mobile device, when undertaking work integrated learning compared to other non-work situations.

Methods: A validated online survey was administered to students while on placement in a range of health care settings in two Australian states.

Results: There were 84 respondents, with 56% (n = 47) reporting access to a mobile or portable device. Differences in use of a mobile device away from, compared with during WIL, were observed for non-work related activities such as messaging (P < .001), social networking (P < .001), shopping on the Internet (P = .01), conducting personal business online (P = .01), and checking or sending non-work related texts or emails to co-workers (P = .04). Study-related activities were conducted more regularly away from the workplace and included accessing University sites for information (P = .03) and checking or sending study-related text messages or emails to friends or co-workers also occurred (P = .01). Students continued to access nursing, medical, professional development, and study-related information away from the workplace.

Conclusions: Undergraduate nurses limit their access to non-work or non-patient centered information while undertaking work integrated learning. Work-related mobile learning is being undertaken, *in situ*, by the next generation of nurses who expect easy access to mobile or portable devices at the workplace, to ensure safe and competent care is delivered to their patients.

Key words: undergraduate nurse; mobile; work integrated learning.

Introduction

The rapid evolution of digital technology in health care environments has created new challenges for learning and teaching (L&T). While increasing access to mobile or portable devices has enabled opportunities for promoting learning at the workplace in real-time (Abbott & Coenen 2008; Sharples, Taylor & Vavoula 2005; Traxler 2007). There is also the risk that portable devices may distract from patient or client care if used by health professionals or students during employment or work integrated learning (WIL) (ECRI Institute 2012; Lindley & Fernando 2013; McBride, LeVasseur & Li 2013). Undergraduate nurses undertake one third of their course in a range of health care settings. Experiential learning provides students with the opportunity to link theory with practice and augments learning, *in situ*. Previous studies have indicated that access to mobile or portable devices at point of care, may be cause for concern regarding patient or client safety (ECRI Institute 2012; Harrison, Koppel & Bar-Lev 2007; Katz- Sidlow et al. 2012; Lindley & Fernando 2013; McBride, LeVasseur & Li 2013), professional identity (Johnson et al. 2012; Öhlén & Segesten 1998), or workforce development opportunities (Bembridge, Levett-Jones & Yeun-Sim Jeong 2011; Smedley 2005).

However, there is little research regarding the frequency of use or the type of information accessed on mobile devices by undergraduate nurses during WIL.

The reported use, effectiveness, and impact of eHealth and mobile devices internationally is similar to the Australian situation. Systematic reviews demonstrate that evidence is required to guide clinicians and develop frameworks for use in clinical environments (Mickan et al. 2013; van Gemert-Pijnen et al. 2011). The Australian National E-Health Strategy identified that a health workforce skilled in information communication technology (ICT) was a key area for driving change that could transform health care delivery (Australian Health Ministers' Conference 2008). Furthermore, the Workforce Development Strategy (Australian Workforce and Productivity Agency 2012) emphasised the need for more creative and effective use of ICT and the need to improve the digital literacy of health professionals. Studies have found that although health profession students report ubiquitous use of computers, it is not translated into ICT competency (Hallam et al. 2008; Mather 2012). Inclusion of ICT literacy development in all undergraduate nursing programs is a requirement of the Australian Nursing and Midwifery Council (Australian Nursing and Midwifery Accreditation Council 2012). National Strategies and registered health profession bodies contend that educational preparation of student nurses in ICT literacy at an individual level is critical for ensuring competency that is reflected at a systems level in health care environments.

Gray and colleagues (Gray et al. 2014) reviewed the implementation and effectiveness of clinical informatics education for future health professionals and concluded that a more sophisticated and scholarly approach to further pedagogical enquiry into clinical informatics education was required. Lindley and Fernando (Lindley & Fernando 2013) asserted that curriculum content and L&T approaches at a systems level needed to improve preparation of students for their future careers.

The second global survey on eHealth (WHO 2011) identified a range of challenges that mobile technology posed at individual, organisation and systems levels. Due to the complexity of the health sector, integrating mobile technologies into routine health care practice at point of care has been slow. There is a range of factors that impact at an individual, organisation, and systems level (Ajzen 1991; Bandura 1977; Vallerand et al. 1992). Environmental factors include institution and organisation governance, policy and ICT architecture, or infrastructure that prohibit or reduce access to mobile or portable devices at the workplace (Harrison, Koppel & Bar-Lev 2007).

Previous studies have focused on the technology available rather than the learning afforded by its use (Sharples, Taylor & Vavoula 2005). Students can now engage and capture, in real-time moments they regard as significant for learning (Fink 2003) which are then used to scaffold understanding or build knowledge (Brookfield 1995; Vygotsky 1978). Mobile learning (mlearning) in the workplace enables a student-centred approach whereby an effective and efficient response can be obtained as they arise (Bromage et al. 2010). Students can merge the nexus of theoretical learning, while developing skills to augment their learning by accessing web-based resources such as YouTube clips, text or images for medication management or nursing diagnosis information. Additionally, informal learning at point of care creates opportunity for patient-centred, participatory care that could improve health outcomes by enabling access to resources and individualised treatment plans (Boulos et al. 2011; Eva et al. 2009). Mobile learners have considerable control over their learning, they can share, store, re-purpose, and re-use objects and artefacts for use in discussion, reflection, or peer review later at a more suitable place or time (Ruiz, Mintzer & Leipzig 2006; While & Dewsberry 2011). While mlearning also offers opportunities to access expert advice or opinion on a global scale, there are challenges and risks associated with introducing L&T innovation into the workplace.

Perceived risks associated with using mobile devices in the workplace have been investigated. Potential distraction from patient care while using a mobile device *in situ*, is well documented (Coiera, Kidd & Haikerwal 2012; Gray et al. 2014; Harrison, Koppel & Bar-Lev 2007; Lindley & Fernando 2013; McBride, LeVasseur & Li 2013). However, the benefits of accessing L&T information by using mobile devices at point of care have been less thoroughly researched. Mather and colleagues (2013) found there were a number of human factors that reduced the capacity of clinical supervisors in effectively using mobile learning approaches during WIL. These include intrinsic and extrinsic motivations (Lorig & Holman 2003; Ryan & Deci 2000), social presence, peer

disapproval (Mather, Marlow & Cummings 2013), or infection control (Brady et al. 2012; Trivedi et al. 2011). The need to further explore the limited implementation of mobile learning using mobile devices has emerged leading to this study. This publication reports on the results of an online survey administered to undergraduate nurses in a range of health care settings. The aims of the survey were: (1) to advance understanding how mobile devices were used to access information at, and away, from the workplace; and (2) to determine differences in accessing information by students during WIL or away from the workplace.

Methods

Study Design

This cross-sectional study captured self-report of undergraduate nurses' access to Internet or device-based resources, using a mobile or portable device at, and away, from the workplace. The study involved administration of a survey to undergraduate nurses, while they were in clinical practice during January 2014, at a range of health care settings in two Australian states.

Ethical Approval

Minimum risk ethics for this research was approved by the University of Tasmania Human Research Ethics Committee, approval number H0013729. Consent was implied by completion of the survey.

Participant Recruitment

Eligible participants were identified through consultation with lecturers from the University. All participants were undertaking WIL and were recruited via email. Two reminder request emails were sent at two week intervals following the initial request.

Data Collection

Of the 22 survey items relating to utilization of mobile devices to access information, 15 were from a validated tool developed by McBride, LeVasseur and Li (2013). Professional experience placement (PEP) was the term used in the survey to describe WIL. 'Away from PEP' was defined as when the student was not undertaking placement as part of their studies and 'During PEP' meant the student was undertaking workplace learning or clinical placement hours in a health care setting as part of their study. Five-point Likert scale questions (Scale of 1-5: 1: Never, 2: Once per day, 3: 2-5 times per day, 4: >5 times per day, 5: Not applicable) were used to determine frequency of use when away and while undertaking WIL.

Data Analysis

The survey data were imported into IBM SPSS (Version 21) for analysis and frequencies were investigated. Chi-square tests were utilized to explore differences between those who had access to a mobile device and those who did not. Differences in responses to scales for 'Away from PEP' and 'During PEP' were explored using Wilcoxon signed ranks tests. All tests were two-sided and differences were accepted at $P < .05$ significance level.

Results

Participants

A total of 476 students undertaking WIL were offered the opportunity to participate in the online survey and 84 responded (18% response rate). There were 37 respondents (44%) who participated in WIL in New South Wales, and 38 (45%) in Tasmania. Of those respondents, 45 (54%) were in their first year of nursing study. Furthermore, 44 respondents (52%) undertook WIL at tertiary health care facilities and the remainders were dispersed at district hospitals or community-based facilities.

A filter question requiring access to a mobile or portable device (Do you have current access to a mobile technology device?) rendered 37 respondents ineligible to complete the second section of the questionnaire. Table 5 presents demographic information for all respondents and those who had access to a mobile device. No differences were found in access to mobile devices for gender [$\chi 2$ (1) = 0.0, P = 1.0], ethnicity [$\chi 2$ (1) = 0.0, P = 1.0] or geographic location [$\chi 2(1) = 0.8$, P = .4] . There were insufficient expected cell frequencies to establish associations for age group, level of education, and focus of health care organisation. Additionally, there was no difference between the two groups when the categories were collapsed to investigate associations between access to a mobile device and type of WIL (tertiary or other health care) organisations. Final year students were more likely to have access to a mobile or portable device than first year students [n = 23 (77%) versus n = 24 (53%), $\chi 2(1)$ = 4.2, P = .04].

Table 5. Demographic information of respondent access to a mobile or portable device.

Demographic descriptor	All respondents N=84[b]	Access to a portable or mobile device N=47[b]
Gender		
Male	19 (23%)	14 (30%)
Female	56 (67%)	33 (70%)
Missing; non respondents	9 (11%)	0 (0%)
Age		
<21	10 (12%)	4 (9%)
21-30	22 (26%)	13 (28%)
31-40	20 (24%)	15(32%)
41-50	13 (15%)	8 (17%)
>51	10 (12%)	7 (15%)
Incomplete	9 (11%)	0 (0%)
Language, other than English spoken at home		
Yes	24 (29%)	14 (30%)
No	51 (61%)	33 (70%)
Missing	9 (11%)	0 (0%)
Level of education prior to this course		
Secondary	20 (24%)	9 (19%)
Vocational certificate	21 (25%)	15 (32%)
Undergraduate degree	26 (31%)	18 (38%)
Post graduate	8 (10%)	5 (11%)
Missing	9 (11%)	0 (0%)
State where student undertook WIL		
NSW	37 (44%)	23 (49%)
TAS	38 (45%)	24 (51%)
Missing	9 (11%)	0 (0%)
Year of study		

Demographic descriptor	All respondents N=84[b]	Access to a portable or mobile device N=47[b]
First year	45 (54%)	27 (57%)
Final year	30 (36%)	20 (43%)
Missing	9 (11%)	0 (0%)
Focus of care of health organisation		
Major hospital	44 (52%)	31 (66%)
District hospital	11 (13%)	5 (11%)
Primary care	5 (6%)	2 (4%)
RACF	3 (4%)	2 (4%)
Multipurpose	2 (2%)	1 (2%)
GP	3 (4%)	3 (6%)
Mental health	4 (5%)	2 (4%)
Other	3 (4%)	1 (2%)
Missing	9 (11%)	0 (-)
Access to portable or mobile device		
Yes	47 (56%)	
No	12 (14%)	
Missing	25 (30%)	

[b]May not equal 100% due to rounding

Use of Mobile Devices

Differences in participant reports of behavior in accessing information away from and during WIL were found for several variables (Table 6). Activities were categorized into work, non-work, and study-related tasks. Work-related activities were patient-centred activities that occurred at point of care, or related to education or professional development. Non-work related activities involved communication and personal tasks that were not of the nature or scope required in the workplace.

Non-Work Related Activities

Differences in access to information using a mobile or portable device away from or at the workplace, were reported for the 6 out of the 7 items grouped in non-work related activities. Non-work related uses of portable devices were more frequent when students were away from the workplace. These included messaging (Mdn 4 vs. Mdn 2, $T = 49.5$, $P < .001$), social networking (Mdn 4 vs. Mdn 1, $T = 48.5$, $P = .01$), shopping on the Internet (Mdn 1 vs. Mdn 2, $T = 17.5$, $P = .01$), conducting personal business online (Mdn 2 vs. Mdn 1, $T = 48.0$, $P = .01$), and checking or sending non-work related texts or emails to co-workers (Mdn 2 vs. Mdn 1, $T = 43.0$, $P = .04$).

Study-Related Activities

Study-related activities that were conducted more regularly away from the workplace included browsing in the Internet (Mdn 4 vs. Mdn 3, $T = 16.5$, $P < .001$), or accessing University sites for information (Mdn 4 vs. Mdn 3, $T = 63.0$, $P = .01$). Checking or sending study-related text messages or emails to friends or co-workers also occurred (Mdn 3 vs. Mdn 2, $T = 43$, $P = .01$).

Away From Work integrated Learning

There were no differences found away from or during WIL for accessing work-related activities such as accessing drug, nursing, and medical information or professional education and development resources. Students reported infrequently accessing study-related text or email messages from academic supervisors or submitting assessment tasks using a mobile or portable device. Respondents also used a mobile or portable device as a clock or a stopwatch (Mdn 4 vs. Mdn 2, T = 61.5, P = .01) more regularly away from the workplace.

During Work integrated Learning

Participants reported that during WIL they did not shop on the Internet; check or post on social networking sites; play online or games loaded on the device; conduct personal business online; or check/send personal text messages or emails to co-workers. Access to work-related protocols and mobile apps that assist with patient or client care were more likely (once per day) to be accessed during WIL.

Non-Access

Respondents reported they did not access sites for patient handouts and teaching, communicating with other members of the health care team to coordinate patient or client care, or to play games.

Table 6. Utilization of portable or mobile devices during work integrated learning.

Use of portable or mobile devices to access information	Away from PEP Median, (Range)	During PEP Median, (Range)	P-value
Work-related activities			
I access work-related drug references	3 (1-5)	3 (1-5)	.94
I use it to communicate with other members of the health care team to coordinate patient or client care	1 (1-5)	1 (1-5)	.94
I access work-related protocols	1 (1-5)	2 (1-5)	.90
I access work-related apps that assist patient or client care	1 (1-5)	2 (1-5)	.75
I access sites for patient handouts and teaching	1 (1-5)	1 (1-5)	.53
I use the device as a calculator for nursing/medical formulas	2 (1-5)	2 (1-5)	.52
I access sites for professional education and development	3 (1-5)	3 (1-5)	.23
I access work-related nursing/medical information	3 (1-5)	3 (1-5)	.21
Non-work related activities			
I check/send personal text messages or emails to family or friends	4 (1-5)	2 (1-5)	<.001
I check/post on social networking sites (Facebook, Twitter, Snapchat etc.)	4 (1-5)	1 (1-5)	.01
I shop on the Internet	2, (1-5)	1 (1-5)	.01
I conduct personal business online (e.g. paying bills, banking)	2 (1-5)	1 (1-5)	.01
I play games loaded on the device[c]	1 (1-5)	1 (1-5)	.05
I check/send personal text messages or emails to co-workers	2 (1-5)	1 (1-5)	.04
I play online games	1 (1-5)	1 (1-5)	.84
Study-related activities			
I browse (e.g. use a search engine Google, Safari etc.) for information to assist with progression of my studies[c]	4 (1-5)	3 (1-5)	< .001
I check/send study related text messages or emails to friends or co-workers	3 (1-5)	2 (1-5)	.01
I access University related sites (e.g. MyLO) to assist with progression of my studies[a]	4, (1-5)	3, (1-5)	.01

Use of portable or mobile devices to access information	Away from PEP Median, (Range)	During PEP Median, (Range)	P-value
I check/send study related text messages or emails to my academic supervisors[c]	2, (1-5)	2, (1-5)	.26
I access study related sites (eg library, journal articles) to assist with progression of my studies[c]	3, (1-5)	2, (1-5)	.03
I submit assessment tasks[c]	2, (1-5)	2, (1-5)	.44
Other activity			
I use the device as a clock or stopwatch[c]	4, (1-5)	2, (1-5)	.01

[c]Non-validated question.

Discussion

This study demonstrated differences in accessing the Internet or device-based resources using a mobile or portable device at, and away, from the workplace by undergraduate nurses (Table 6). Undergraduate nurses reported there was a range of non-work related Internet-based activities they avoided during WIL. Predominantly these activities related to social networking with family or friends, shopping, or conducting personal business online. McBride, Le Vasseur, and Li (2013) and others (Coiera, Kidd & Haikerwal 2012; ECRI Institute 2012; Gray et al. 2014; Harrison, Koppel & Bar-Lev 2007) indicated that risks to patient or client safety could be attributed to individual level distraction at point of care. While distraction may occur while using a mobile or portable device during WIL (ECRI Institute 2012; McBride, LeVasseur & Li 2013), this study found it was unlikely due to student nurses' accessing non-work related sites.

The research indicates that through lack of access to mobile devices or resources there were lost opportunities to engage with patients or clients at point of care. Undergraduate nurses reported they never accessed patient handouts for teaching or communicating with other members of the health care team to coordinate patient care. At registration there is an expectation that students are work-ready (Duchscher 2009; Walker & Campbell 2013). There is an expectation students will develop professional identity during their course and during their final year, during WIL, they will develop the knowledge, skills, attitudes, and behaviour that demonstrate competency for registration (Öhlén & Segesten 1998). A key role for nurses is providing patients with health education and with guidance final year students may initiate and engage patients in improving their health literacy. A lack of access to web-based resources at point of care can hinder or undermine this development of professional identity (Johnson et al. 2012; Öhlén & Segesten 1998). Additionally, senior undergraduate students could be involved with coordination of patient care if they had the opportunity. Self-management education at point of care creates opportunity for shared understandings that can improve health outcomes of patients or clients by enabling access to resources and individualized treatment plans (Eva et al. 2009; Lorig & Holman 2003). Modelling of professional behaviours required as a graduate nurse, including access to web-based self-management or health education resources, could promote work-readiness of students and minimize transition shock (Duchscher 2009; Walker & Campbell 2013).

There was no demonstrated difference in behaviour for accessing work-related drug references, nursing or medical information, and professional education and development. Undergraduate students continue to study when they are not at the workplace. The convenience of enabling access to mobile or portable devices *in situ* could promote habits that support continuing professional development and life-long learning which are requirements for continuing registration (Australian Health Practitioner Regulation Agency 2013; Venkatesh, Thong & Xu 2012).

Differences were found in browsing for information, accessing study or University related sites, which predominantly occurred away from WIL. The convenience and ease of using a mobile device supported student–centred learning (Sharples, Taylor & Vavoula 2005; Venkatesh, Thong & Xu 2012) away from and during WIL. Although no differences were found, mobile devices were used for contact with academic supervisors and submission of assessments. Access to mobile devices enables the activity of learning to be user-controlled (Sharples, Taylor & Vavoula 2005). The convenience

and ease of learning in real-time at point of care challenges traditional pedagogy. Utilization of mobile devices to access a range of study information has implications for learning at systems, organisational and individual levels that need to be acknowledged and addressed through curriculum design and organisational policy. Addressing educational preparation in ICT competency and guidance in safe and appropriate use of mobile learning in the classroom, prior to undertaking WIL, could assist with the development of professional identity. Policy development to guide undergraduate students and health profession staff about effective and competent use of mobile devices *in situ* could also ameliorate the risk of distraction at point of care.

While away from the workplace students tend to use mobile or portable devices to monitor time. This behavior was less likely during WIL, suggesting that undergraduate students did not access their mobile device to conduct patient observations such as pulse or respiration assessments. Institution or organisation policy that dissuades the use of mobile or portable devices during WIL may be a factor for regulating use (Mather, Marlow & Cummings 2013). Concerns about cross infection between patients could also prohibit the use of a mobile device for this intimate patient activity (Brady et al. 2012; Trivedi et al. 2011).

Respondents indicated that communicating with family, friends, co-workers, and study were more likely to be accessed than playing online games loaded on the device while away from or during WIL. Communication or maintenance of meaningful relationships may contribute to lack of interest in playing games using a mobile device. The predominance of females in the cohort may also have negatively skewed the result as females are less likely than males to game (Maisonave 2014).

Limitations

This study had several limitations. The first included the low response rate that may have occurred because although the survey was anonymous, it may have contributed to students feeling that if they did not respond appropriately there was a chance of disadvantage with their studies. Additionally, survey fatigue of students may also have contributed to a lower level of engagement with completion of the survey. Respondents were recruited from one university and may attend WIL at partner health care organisations that have guidelines impacting the conduct by students during WIL, which could reduce the generalizability of the findings. Of the questions asked, 7 relating to access to study options were not validated. In these cases the sentence construction was similar to the validated questions, however their actual reliability is unknown at this time. Finally, as this survey has been administered by staff at the teaching university there is the possibility of social desirability bias, the tendency to respond to questions in a known socially acceptable manner.

Future directions

Further examination of preferred mobile or portable devices used for L&T by undergraduate nurses is warranted. Review of higher education institutional and health care organisation policy relating to mobile devices could reveal there is a need to change to allow students to prepare for their future profession in accessing learning objects or resources while they are undertaking WIL. Concurrently, there is a need to ensure ICT architecture and infrastructure at organisations supports L&T at the workplace. Curriculum design to incorporate appropriate and safe use of mobile devices is necessary to promote diffusion of this informal method of L&T into the workplace. Over time, responsible use of mobile devices to minimize risk could create a cultural shift that will enable safe use for L&T *in situ* at point of care.

Conclusion

Exploration of the access to information using a mobile or portable device by undergraduate nurses away from and during WIL contributes to the discourse about the challenges of using these devices at systems, organisational, and individual levels. This study found that undergraduate nurses limited their access to non-work or non-patient-centred care while undertaking WIL. Furthermore, the risk of distraction was unlikely due to student nurses' accessing non-work related sites (ECRI Institute 2012; McBride, LeVasseur & Li 2013). The use of mobile devices for study purposes occurred during WIL,

but was more frequent away from the workplace. This suggests students were focused on developing competency in patient care while in the workplace. Acceptance of access to mobile devices as a legitimate L&T tool during WIL is imperative. To support this aim there is a need to promote professional identity and facilitate L&T by including guidance for appropriate mobile learning behaviour in the curriculum. The development of best practice guidelines or policy to minimize risk and enable improvement of health outcomes of patients at point of care is necessary. Undergraduate students are the next generation of nurses. This study showed they can discern appropriate mobile device use. Over time, nurses will expect easy access to mobile learning resources to enable them to deliver safe and effective health care to patients.

4.3 Introduction to publication 5

Identifying differences in preferred behaviour by undergraduate nurses in the use of mobile or portable devices during or away from work integrated learning is important to understand how mobile learning can be used safely and appropriately in healthcare environments. Student nurses did have preferences for using their mobile devices at and away from the workplace. They indicated that mobile technology would be ubiquitous in their environment and they were confident in using it for study and work purposes. They also indicated the use of mobile or portable devices could be beneficial for patient care, accessing learning or professional education and development information. There were different perspectives depending found depending on whether work integrated learning was undertaken at a major hospital or community organisation. These perspectives suggest that enculturation about the use of mobile or portable devices may have already occurred prior to participation in this study. Demonstrating development of digital professionalism as part of professional identity formation needs to be introduced early in the curriculum, so that student nurses understand the benefits as well as the risks and challenges of using mobile technology at point of care. This chapter shows the development of policies and guidelines within healthcare environments is necessary to support healthcare professionals integrate the use of mobile or portable devices as a legitimate nursing function.

4.4 Publication 5 - Undergraduate nurses' preferred use of mobile devices in healthcare settings

Mather, CA and Cummings, EA and Allen, PL, "Undergraduate Nurses' Preferred Use of Mobile Devices in Healthcare Settings", *Studies in Health Technology and Informatics*, **208** pp. 264-268. doi:10.3233/978-1-61499-488-6-264 ISSN 0926-9630 (2015).

Chapter 4.4 has been removed for copyright or proprietary reasons.

4.5 Commentary on Chapter 4

Undergraduate nurse preferences for using mobile or portable devices in healthcare environments challenges the *status quo*. Their responses indicate they understand the importance of knowing when to use mobile or portable devices and they perceive some healthcare settings are more amenable to its use than others. Whether this perception is valid requires further research. This research shows student nurses are confident in using mobile or portable devices at, and away from the workplace. Student nurses are also aware of benefits, risk and challenges of using mobile technology in healthcare environments. Integration of mobile technology for learning and teaching, informal learning, CPD at point of care is imminent. There is an urgent need to develop policies and guidelines at organisation and systems levels, about the use of mobile technology, to support and guide healthcare professionals in safe and appropriate use of mobile technology. Educational preparation and modelling of digital professionalism as part of professional identity formation needs to be developed simultaneously to ensure safe, efficient and effective care of patients is delivered.

Student nurses access a range of work, non-work and study-related activities outside the work environment. Undergraduate nurses are compliant in following current University and organisation policy or workplace culture regarding the use of mobile or portable devices. This chapter provides pertinent information that can contribute to curriculum development for preparing undergraduate students in safe and appropriate behaviour when undertaking work integrated learning. The research also demonstrates that there is potential for harnessing mobile learning at point of care. This chapter contributed to answering research question 1, objective 2:

> *RQ1 RO2: To understand the nature and scope of usability of mobile learning in situ, at point of care, by undergraduate nurses, for learning and teaching, informal learning or continuing professional development in healthcare environments?*

Undergraduate nurses understand their decrements in mobile or portable devices during work integrated learning. Participants also reported they would like to be able to access mobile learning opportunities while at the workplace. These studies show there is a gap in access and use of portable or mobile devices at the workplace. This inability to harness the benefits of mobile learning at point of care is demonstrated by this research, which contributes to answering research question 1. The current situation shows there is a limited acceptance by undergraduate nurses due to higher institution, organisation or local policy. Students are currently compliant, however reported they would prefer access to mobile technology in healthcare environments. Participants indicated their behaviour regarding using mobile technology could differ depending on their workplace as they understood the potential for inappropriate use. The absence of governance regarding appropriate use of mobile or portable devices impacts undergraduate nurses' report of their mobile learning preferences as indicated by their responses where enculturation of use has shaped their perceptions.

Chapter 5 Governance, professionalism and mobile learning

Quinon proficit deficit

He who does not advance, go backwards

(Unknown)

Synthesis of understanding the current situation regarding the access, use and usability of mobile learning within healthcare environments by registered nurse supervisors and undergraduate nurses was published as two peer-reviewed journal publications. These publications describe the impact of the inability to use mobile learning for learning and teaching during work integrated learning or at the workplace of clinical supervisors and students. These publications reveal the *mobile learning paradox* that exists in healthcare environments in two Australian states. Studies of the current situation shows that lack of governance and professionalism issues impact on deployment of mobile learning at point of care. Nurse supervisors are limited in their ability to model safe and appropriate behaviour to their students. Students have little capacity to be guided and supported to learn how to use this andragogy while undertaking work integrated learning. These studies show the lack of access and use of mobile learning for learning and teaching of nurses is a missed opportunity for ensuring the next generation of nurses have developed digital professionalism as part of their professional identity formation and are work-ready at graduation. This chapter is divided into five sections:

- Section 5.1 provides an introduction to publication 6 which reveals the conundrum of nurse supervisors using mobile technology that is known as the mobile learning paradox;
- Section 5.2 presents publication 6 - *Unveiling the Mobile Learning Paradox;*
- Section 5.3 provides an introduction to publication 7 which outlines undergraduate nurses' perspectives on developing digital professionalism and deploying mobile learning during work integrated learning;
- Section 5.4 presents publication 7 - Issues for deployment of mobile learning by nurses in Australian healthcare settings; and
- Section 5.5 provides commentary on Chapter 5 and its contribution to answering both research objectives of both research questions 1 and 2.

5.1 Introduction to publication 6

The first publication in this chapter is an analysis of the use of mobile learning strategies in healthcare settings from six focus groups of nurse supervisors. These health professionals have the responsibility of learning and teaching of undergraduate nurses while they are undertaking work integrated learning. These educators enable high quality learning environments by guiding and supporting their students to link theory with practice. Using digital technology to prepare students before, enhance learning during, and clarify or reinforce learning after interactions with patients, colleagues or peers is a new andragogy that can enhance learning and teaching at point of care. Access in real-time to look-up or clarify information without leaving point of care with the potential to involve patients in their own care is hindered by absence of policy or guidelines to direct appropriate behaviour.

5.2 Publication 6 - Unveiling the mobile learning paradox

Mather, C and Cummings, EA, "Unveiling the Mobile Learning Paradox", *Studies in Health Technology and Informatics*, **218** pp. 126-31. doi:10.3233/978-1-61499-574-6-126 ISSN 0926-9630 (2015).

Abstract

A mobile learning paradox exists in Australian healthcare settings. Although it is increasingly acknowledged that timely, easy, and convenient access to health information using mobile learning technologies can enhance care and improve patient outcomes, currently there is an inability for nurses to access information at the point of care. Rapid growth in the use of mobile technology has created challenges for learning and teaching in the workplace. Easy access to educational resources via mobile devices challenges traditional strategies of knowledge and skill acquisition. Redesign of learning and teaching in the undergraduate curriculum and the development of policies to support the use of mobile learning at point of care is overdue. This study explored mobile learning opportunities used by clinical supervisors in tertiary and community-based facilities in two Australian States. Individual, organisation and systems level governance were sub-themes of professionalism that emerged as the main theme and impacts on learning and teaching *in situ* in healthcare environments. It is imperative healthcare work redesign includes learning and teaching that supports professional identity formation of students during work integrated learning.

Key words: Mobile learning, mlearning, clinical supervision, work integrated learning, learning *in situ*.

Introduction

Access by health professionals to mobile learning (mlearning) through the use of mobile or portable devices in healthcare settings is mixed (Mather, Marlow & Cummings, E 2013). Mobile learning in this context is defined as accessing or browsing content for the purpose of learning using a mobile or portable device, *in situ*, at point of care, in the workplace. Opportunities for mlearning are increasing, however, currently there are no standards, guidelines or protocols directing the use of mobile devices for nurses in the workplace (Mather & Cummings, 2014; Raman 2015). Currently, in Australia, there is a mobile learning paradox in healthcare settings. There is an inability of nurses to access mlearning, while it is increasingly recognised that utilisation of mobile or portable devices at point of care can improve care and improve patient outcomes (McBride, LeVasseur & Li 2013; Mickan et al. 2013). These studies demonstrate that further understanding about how mlearning and teaching (L&T) is currently undertaken by clinical supervisors who guide, support and facilitate learning of students and remain contemporary in their role is required. Additionally, modelling of professionalism to students by clinical supervisors has become increasingly important to promote work-readiness at registration. This qualitative study explored the current mlearning strategies undertaken by a group of clinical supervisors in tertiary and community-based healthcare settings to understand how they navigate L&T opportunities within the current mlearning paradox that exists in healthcare environments in Australia.

Background

Previous research undertaken by the authors indicated there was a need to ensure clinical supervisors had an understanding of University requirements and they were competent and contemporary in theoretical knowledge and skills (Mather Marlow & Cummings, 2013). Continuing professional development of clinical supervisors was necessary to enable high quality clinical experiences for students. Further exploration of this issue to develop strategies to provide appropriate resources and strengthen partnerships between the University and supervisors of students in the workplace, found there were barriers and challenges, at individual, organisation and systems levels, to the use of mlearning by learners and teachers in a range of healthcare settings. Clinical supervisors were impeded through lack of educational preparation and confidence at an individual level (Mather, Marlow & Cummings 2013). Recent research demonstrated that support of clinical supervisors to

become conversant with mobile technology can enable them to become 'change champions' to model and lead in the appropriate use of mobile technology within the workplace (Mather, Marlow & Cummings 2013). Although digital strategies used to inform and up-skill clinicians were well received, an evaluation found there was limited adoption in the workplace due to organisation and systems barriers. Impediments included inability to use mobile devices, peer disapproval and lack of access to data within healthcare settings. However, due to the distributed nature of work integrated learning (WIL) it remains essential that clinical supervisors and students have access to L&T resources. Undergraduate nurses' current and preferred use of mobile devices demonstrated an expectation of timely, easy, and convenient access to information to augment their learning. Clinical supervisors modelling behaviours that prepared students to transition to registered nurse during WIL and minimise transition shock was valuable (Mather, Cummings & Allen 2015).

Previous studies have indicated information communication technology (ICT) literacy among health professionals is mixed (Hegney et al. 2007; Mickan et al. 2013). The emergence and rapid adoption of the use of ICT now provides opportunity for deployment of mlearning within healthcare settings. Sharples, Taylor and Vavoula (2005) offered a framework for theorising about mlearning that described the convergence between learning and technology, indicating it is the learning that is important rather than the technology afforded by its use. They identified that context is constructivist, as learners build knowledge through interacting with their environment (Sharples, Taylor & Vavoula 2005). The co-evolution of L&T and acceptance of mobile technology has implications for the integration of mlearning at the workplace. It could promote habits by students that support continuing professional development and life-long learning which are requirements for continuing registration (Australian Health Practitioner Regulation Agency 2013).

Lambert and Glacken (2005) discussed the importance of the role of clinical supervisor for supporting and guiding high quality clinical placements for learners. Research into factors that contribute to optimal WIL environments has indicated that if students receive more than clinical guidance and support from their supervisors, their experience is more positive (Newton et al. 2015; Papathanasiou, Tsaras & Sarafis 2014). Enhanced learning by students created by the development of partnerships between supervisor, patient and learner is becoming more recognised as a learning strategy that assists with modelling of attributes that contribute to the formation of professional identity and minimise transition shock (Papathanasiou, Tsaras & Sarafis 2014). Enabling the use of mlearning at the workplace is a component of professional identity formation that needs exploring (Strandell-Laine et al. 2015).

Over time, there is the expectation that deployment of mlearning *in situ* will become more common. It is imperative to understand how this activity can be incorporated into L&T, informal learning and for professional development and be integral within the formation of professional identity. The aim of this qualitative study was to explore current mlearning strategies employed by clinical supervisors to augment learning in tertiary and community-based healthcare settings in two Australian States.

Methodology

Six focus groups were conducted between July and November 2014 by one researcher to elicit information about the use of mlearning strategies by clinical supervisors. Invitations to participate were emailed to clinical supervisors involved with guiding and supporting undergraduate students from one University. Each group was a mix from tertiary and community-based facilities and were comprised of between three and 7 participants. Focus groups were up to one-hour duration and audio-recorded, then transcribed verbatim. Data analysis was undertaken using thematic analysis. Themes were developed independently by two researchers and then cross-checked, to ensure validity. Minimum risk ethics committee approval was gained for this study (H13729).

Results

Six focus groups were held with 27 clinical supervisors participating. Approximately half of the respondents were from each State and were an equal mix of clinicians from tertiary and community-based facilities. The theme of professionalism was key to addressing mlearning opportunities used by

clinical supervisors *in situ*, at point of care in the workplace. The key theme professionalism embodies competence and behaviour ascribed by the nursing profession. Student nurses develop their professional identity through a range of strategies including modelling behaviours they observe and perceive to be professional. Similarly, clinical supervisors recognise there is a standard of behaviour they are expected model with students. In Australia there is an identified minimum standard of knowledge, skills, attitudes and behaviour of nurses guided by the Australian and Midwifery Council Competency Standards (Australian Nursing and Midwifery Council 2006) and Code of Professional Conduct (Nursing and Midwifery Board of Australia 2013c). Clinical supervisors in this study recognised 'workarounds' were developing when engaging in L&T in the workplace. Strategies used to solve limitations created by lack of, or access to mlearning impacted on clinical supervisors' emic perspective of the standard of professionalism.

Analysis of the data identified there were a range of positive and negative behaviours that impacted on the perception of professionalism by clinical supervisors. The capacity of them to model appropriate learning behaviour to students to assist with the formation of professional identity at an individual level created by the current mlearning paradox was arrested.

Individual governance: Positive professional identity formation

Positive attributes that access to mobile or portable devices *in situ* enabled included increased time with patients at the bedside; reducing the need to look up information away from point of care; and the potential to involve patients in their own care.

> *"I would like to see not so much phones but things like iPads used for patient education. I think it would be really valuable… we tend, when patients ask things, to go back to the desk, look it up, and then print something out… patients are far more educated now than they've been but not always with the right sources… it would be nice to be able to give an iPad to a patient and say well, you know have a bit of a read…you could do that together as well… and actually point them in the right kind of information".*

Clinical supervisors indicated there were opportunities to reduce errors as information could be looked up or verified in real-time and also prevent duplication. Mobile learning information could be used for prompting appropriate sequences when undertaking clinical procedures. Participants considered mobile devices could improve collegiality within teams by enabling communication with their peers even when absent from the workplace. Participants also indicated the provision of another learning style afforded by using mobile devices for patient education could strengthen the nurse-patient relationship. Furthermore, inclusion of students in this new pedagogical approach to learning was viewed as positive for the development of rapport with patients and clinical supervisors.

Individual governance: Negative professional identity formation

Negative attributes impeded opportunities for positive professional identity formation of students, were identified by clinical supervisors. Participants from organisations where mlearning was dissuaded were conscious of the 'ducking out', 'toilet learning' or 'loitering in their lockers' that occurred when a knowledge deficit, clarification or verification of information was identified by students or clinical supervisors. Focus group participants indicated they felt guilty "when actually I'm desperately trying to look up what something in handover meant". Clinical supervisors reported students were perplexed by some of their behaviour, which the clinicians construed as poor role modelling:

> *"it's like well why can't you just bring that out and we can all learn from that because there's only, you know, a certain number of computers on the ward that students can look things up on… we've got so much access to information now, if an iPhone or iPad's the way to get that information why not just use it… I just find it very hidden".*

Participants indicated they felt it was unprofessional to use mlearning when they were aware organisational policy precluded its use. Clinical supervisors were also conscious of body language

that indicated peer disapproval when they undertook mlearning activities. Clinical supervisors reported the mlearning paradox created by inability to access information prevented the "side to side thing" of developing a learning partnership with students and patients.

Organisation governance

Organisation governance directed individual governance at the workplace. Clinical supervisors suggested strategies to integrate mlearning into healthcare work. Participants indicated the need for presence when using mobile devices for mlearning. There was discussion about the need to "announce use" to avoid the assumption they were using their mobile device inappropriately. One participant noted that: "…if you're on a landline it'd probably be alright, she must be talking to a doctor or something. It's a difference without having a cord on it, isn't it?"

Some participants indicated using a mobile device for learning should be seen as a "tool of trade just like taking a blood pressure". Clinical supervisors agreed mobile devices needed to be used properly and "ground rules" were necessary to legitimise its use and ensure entrustability.

Discussion

This research demonstrates that professionalism issues at systems and organisation levels, impact on individual governance and will continue to impede the progression of mlearning in the workplace until there is the development of policies and standards to guide its use in healthcare settings. Lloyd-Williams and Denz (2009) indicate there is acceptance of the value of ICT in healthcare, however, they propose deployment will be more problematic. Raman (2015) suggests organisations need to permit student access to institutional information technology and develop policies on use of the Internet/social media in clinical agencies. Role modelling of appropriate mlearning behaviour is imperative to ensure the next generation of nurses are prepared for their role as registered practitioners. They must be conversant with accepted professional standards of behaviour expected when accessing mlearning. Integration of mlearning can only become embedded when organisations enable professional identity formation about learning *in situ* to occur during WIL.

This study demonstrated healthcare organisations in Australia are yet to understand traditional pedagogical methods are no longer sufficient for preparation of work-readiness of students in the workplace. Whilst formation of professional identity occurs during WIL the quality of workplace-learning environments are affected by the culture and routine practices (Newton et al. 2015). E-conversations and developing virtual communities of practice may be a strategy to ameliorate some of the communication issues and promote professional identity development. The findings of this study concurs clinical supervisors welcome the opportunity to engage with each other at, and away from the workplace. Furthermore, role modelling behaviours that promote communication, informal learning, and continuing professional development will be positive for clinical supervisors, students and patients. Empowerment of nurses to use mlearning may promote the socialisation necessary for positive professional identity formation and development of lifelong learning behaviours. Integrating mlearning as a legitimate nursing function will enable clinical supervisors to guide nursing student behaviour when learning to use mlearning during healthcare work.

For progression of the use of mobile technology to become the norm in healthcare environments, and accepted as part of healthcare work, there is a need to further unveil the mlearning paradox by developing strategies for deployment of mlearning, *in situ* at point of care. For development of a culture of learning, there needs to be development of policies and guidelines at an organisation and systems level to support and guide students and health professionals in the governance of using mobile devices at an individual level. The usability of mlearning networks will only be effective when appropriate and robust policy is developed to guide and support clinicians to learn how to use digital technology during healthcare work. Upholding the tenet of professional identity by conducting mlearning within an overt L&T framework in the workplace will assist in integrating this new pedagogical approach to learning in healthcare settings.

Conclusion

Organisation governance impacts on individual governance in mlearning. The study found that 'workarounds' are used by clinical supervisors to solve issues of timely, easy, access to information in the workplace. This group of clinicians are concerned about the impact of this behaviour on others view, especially students, on their professionalism. Redesign of L&T to include mlearning is overdue. Suggestions to enable legitimisation of mlearning as an integral nursing function during healthcare work were provided by clinical supervisors. Enabling mlearning to become an overt activity that is part of formation of professional identity will promote appropriate behaviour and empower the next generation of nurses to seek information in real-time and solve the mobile learning paradox.

5.3 Introduction to publication 7

To enable deployment of mobile learning as a legitimate nursing function in the workplace necessitates redesign of undergraduate nursing curricula to include educational preparation of students. Undergraduate nurses are the next generation of clinicians and development of digital professionalism, as part of professional identity formation, is required if deployment of mobile learning is to be accepted in the workplace. The inclusion of health technology and informatics is a mandatory requirement for accreditation, and must be embedded within undergraduate nursing courses at a technical, contextual and emancipatory level. To meet this requirement, students need to develop competency and gain an understanding of safe and appropriate use of mobile learning in the workplace. Students need to develop knowledge, skills, attitudes and behaviour in the form of digital professionalism. Advancement of professional identity formation prior to undertaking work integrated learning will promote positive social referencing by students when undertaking learning and teaching with their nurse supervisors. Development of positive digital professionalism can reduce the negative consequences of *workarounds* employed by nurse supervisors to encourage learning of students in real-time at the workplace. This publication explores issues relating to deployment of mobile learning in Australian healthcare environments. Although there are impediments to using mobile learning during work integrated learning, students were aware of professional issues associated with using mobile devices. Respondents also indicated access to resources using mobile technology for clinical or educational purposes will be expected in the future.

5.4 Publication 7 - Issues for deployment of mobile learning by nurses in Australian healthcare settings

Mather, C and Cummings, EA, "Issues for deployment of mobile learning by nurses in Australian healthcare settings" *Studies in Health Technology and Informatics*, **225** pp. 277-281 (2016).

Abstract

Undergraduate nursing curricula are being redesigned to include strategies for deployment of mobile learning as a legitimate nursing function. A recent online survey exploring the use of mobile learning by undergraduate student nurses revealed barriers, challenges, risks, and benefits to using mobile learning at the workplace. Inability to access mobile learning at both individual and organisational levels impacted on student learning and teaching opportunities. Students also indicated that educational preparation for ensuring appropriate use of mobile learning is necessary to guide learning and teaching *in situ* at point of care. This highlights the need for the development of policy to guide best practice that will enable this new pedagogy to be fully utilised for learning and teaching in healthcare settings. Until governance of mobile learning in educational and healthcare settings in Australia is addressed, harnessing the indubitable benefit of mobile learning and teaching will be unachievable.

Key words: Mobile learning, undergraduate nurses; learning and teaching; governance; deployment.

Introduction

Recent studies exploring the use of mobile technology and mobile learning (mlearning) indicate improved efficiencies can contribute to improved health care of patients by health professionals. However, risks and challenges have also been reported by end-users (Mann, Medves & Vandenkerkhof 2015; McBride, LeVasseur & Li 2015). As undergraduate nurses are the next generation of health professionals they must be provided with guidance and support in the use of mlearning in the clinical setting. This research explored current nursing students' (students) perception of the opportunities and barriers of using mlearning at point of care. The findings provided direction for developing contemporary and congruent undergraduate nursing curricula.

The Australian competency standards for nursing and midwifery are currently under review (Nursing and Midwifery Board of Australia 2015). Previous standards have included no specific requirement for nurses' to be competent in health technology and informatics. However, since 2012 the inclusion of health technology and informatics has been a mandatory requirement for accreditation of undergraduate nursing courses in Australia (Australian Nursing and Midwifery Accreditation Council 2012). An ANMAC (2014) additional note outlined that health technology and informatics needed to be embedded at a technical, contextual and emancipatory level. This clearly articulates that all stakeholders need to understand the requirements and integrate health technology and informatics to prepare beginning level nurses in information literacy, knowledge, skills, attitudes and behaviour to ensure work-readiness.

In response to requirements of accreditation (Australian Nursing and Midwifery Accreditation Council 2014) sequencing of new nursing curricula is necessary to reflect the complexity of using health technology and informatics in the workplace (O'Neill, Donnelly & Fitzmaurice 2014). Proficiency in using eportfolios, understanding electronic health records, and digital communication must be achieved (Australian Nursing and Midwifery Accreditation Council 2014). Academics, educators, and supervisors will have to develop the proficiency required for using health technology and informatics during professional practice within healthcare settings (Australian Nursing and Midwifery Accreditation Council 2014). The complexity of health technology and informatics use, level of knowledge and skills needed requires scaffolding throughout curricula to ensure critical thinking occurs with regard to the legal and ethical use of emerging technology, including social media (Australian Nursing and Midwifery Accreditation Council 2014).

Students need to understand the complexity of socio-political and technical points relating to appropriate use of mlearning. Currently there are a number of issues that reduce student's ability to access mlearning in educational or healthcare settings. Students need to understand the implications of inappropriate use. New nursing curricula must include knowledge of operational requirements of using mobile devices in education and healthcare environments (Moyer 2013).

Studies on the use of mobile technology have indicated there are a range of barriers, challenges and risks that need to be overcome before mlearning can become a legitimate nursing function at point of care (Raman 2015). Access to digital devices as an educational tool in healthcare environments in Australia is limited due to a range of individual, organisational, and systems level impediments (Mather & Cummings 2014). Unless these impediments are ameliorated, the deployment of mlearning will continue to be slow. Currently a range of workarounds are used that can impact upon mlearning becoming a legitimate nursing function (Mather & Cummings 2015). Non-compliance with organisational policies perpetuates poor role modelling and hinders appropriate social referencing that occurs when students observe and mimic their nurse educators' behaviour (Mann, Medves & Vandenkerkhof 2015). Utilising mobile devices covertly for learning and teaching in healthcare settings creates tension for end-users and perpetuates the mlearning paradox (Mather & Cummings 2015). Harnessing the opportunity of mlearning in educational and workplace settings will remain problematic if governance regarding using mobile devices by nurses is not addressed (Garba, Armarego & Murray 2015).

Methods

This study comprised an online survey of undergraduate nurses administered while they were undertaking work integrated learning at a range of healthcare settings in two Australian states. This cross-sectional study captured student's self-reported access to Internet or device-based resources, using a mobile device, at the workplace. Participants were recruited by email. The survey contained 22 items relating to use of mobile devices to access information. There were three free text-questions seeking their opinions regarding perceived opportunities and barriers relating to using mobile devices during work integrated learning (or PEP as it is known at this university). Responses were coded by two researchers independently and then cross-checked to ensure validity. Human research ethics was approved (H0013729) prior to commencement of the study. Consent was implied by completion of the questionnaire.

Results

Of the students who indicated that they owned a mobile device (N=47) over three-quarters (n=40, 34 and 35) provided responses to each of the free text questions. Respondents were asked to 1) describe any opportunities they believe could impact on the use of mobile devices during PEP; 2) list their perceptions of barriers to using mobile devices; and 3) comment about access or the use of mobile devices during PEP. From the guided questions, two key themes emerged: 1) enabling access to resources for clinical or educational purposes; and 2) professionalism issues.

Enabling access to resources for clinical or educational purposes

Students indicated use of mobile devices enabled easier access to evidence-based resources on the Internet, agency Intranet or loaded on the device. One student stated *"The laptop is time and space-consuming to set up. Internet access on mobile phones are small and more efficient"* or *"their ability to be transported from one place to another"* and *"allowed me to jot down something I was not familiar with and in my break use my smartphone to look it up".* Respondents also indicated that access to a mobile device was useful for communication. Comments included "*fast access to communicate with other services/multidisciplinary team*" and "*quick reference tool… alarm, clock, calculator, stopwatch, reminder*". Students indicated access to 'best-evidence practice' information was valuable to them. For example: *"very good for intranet usage for evidence based protocols and guidelines"* and *"mobile technology can be very fruitful because it can be used for clearing up any confusion created"*. Respondents listed resources they access using a mobile device including: medication management resources, e-textbooks for *"looking up diseases and understanding pathophysiology"*, and university learning management systems or information.

Professionalism issues

Benefits related to *"patient perceptions/engagement"* or others of nurses using mobile technology. One student stated *"I think a tablet device would look more professional than pulling out a mobile"*. They indicated that access to mobile devices enabled learning and teaching opportunities that facilitated efficient and effective time management that could positively impact on patient care and learning and teaching opportunities. Comments included *"increased access to resources = decreased risk of error eg meds"* and *"having a device capable of quick reference and look up for terms/drugs/ references/pathophysiology etc. may be beneficial while on placement. Physical location of the appropriate resources, can at times, be difficult and time consuming".*

There was enthusiasm for enabling the use of mlearning. *"My facilitator carries a mobile phone which we used because they could not answer my question. So we went to the tearoom, Googled the topic and we both discussed the answer. This assisted in my learning which allowed me to reflect with my preceptor"*. One student stated *"It is a really great resource to ponder and verify when we are in doubt"* and *"I think when they are used appropriately they can be an invaluable tool to aid learning and coordinating effective and efficient patient care"*. One student commented *"using the portable or mobile technology, provided that it is affordable, will have a very positive outcome during PEP such*

as clarifying doubts and revising the subject related activities etc.". "The technology has grown in such a way that it should be useful to everyone".

Comments about proficiency of ICT use pertained to both clinical supervisors and students. One student commented *"encourage IT illiterate preceptors to accept that times have changed and IT is a really useful tool to support clinical practice".*

Responses indicated there were barriers including lack of presence, disapproval, distraction and inappropriate use, including resistance by users. Presence included *"people looking at the device too much instead of listening/eye contact"* and *"a barrier would be the social etiquette involved with students using such devices within the PEP setting".* Students indicated *"patient perception of their use in healthcare settings may be negative, thus impacting on the therapeutic relationships held between them and their healthcare professional"*. One respondent stated *"other health professionals might believe I was neglecting my patients and patients might believe I was neglecting them!"* Comments about distraction included *"maybe distracting for both staff and patients" and "major distraction with access to social media".*

They indicated that organisational and university policy *"clearly instructs students NOT to use our mobile phones during PEP so as not to create the impression we are texting or on Facebook"* and the *"hospital would not allow it and will reprimand you"* or *"facility policy often prevents use"*. They were cognizant of the *"dangers of privacy with patient information and care"* and the *"risk of breach of patient confidentiality"*.

Student comments focused on "battery life, screen size", "availability of charging ports", "speed of the Internet" or devices loaded with resources "may not be regularly updated". Students indicated that theft or loss of the device were a concern. Other comments related to professionalism and included *"I noticed most of the doctors had a device in order to access information/patient results/or clarification of pharmacology"* and *"patients and families could think we are busy talking to our friends or doing something that is not related to caring patients".* Respondents also indicated *"it may look unprofessional to be seen using mobile technology as it may not be assumed it is being used for educational purposes"*. Concerns about inappropriate use of mobile devices such as using it as a torch for examining patients were also raised.

Discussion

Implications for implementing new nursing curricula must be addressed in practice to ensure the next generation of nurses are equipped to optimally utilise health technology and informatics at graduation. Embedding health technology and informatics and appropriate sequencing of knowledge, skills, attitudes, and behaviour development of students requires leadership from the nursing profession to change current governance towards the use of mobile devices in both educational and healthcare environments (Mather & Cummings 2014). Decision making at an organisational level about use of technology for educational purposes will require innovation in planning and implementation, taking heed of lessons of the past such as inadequate consultation; lead-time; training; inappropriate formats; and enabling access to the technology for practice (Mann, Medves & Vandenkerkhof 2015). Minimising resistance at individual and organisation levels will be required for mlearning to be effectively deployed. Facilitation of a change in culture and perception, to enhance understanding of the value of accessing information in real-time, will be integral to success. The use of mlearning as an adjunct to traditional learning methods can assist with ameliorating the theory-practice gap by enabling access to information at the point of need.

Students are aware of, and understand the potential barriers, challenges, risks, and benefits associated with mlearning *in situ*, at point of care. They clearly articulated an understanding of the need to ensure positive behaviour was employed when using mobile devices in the presence of colleagues and patients. Authors report that the majority of patients believed the use of mobile devices by health professionals was work-related (Blocker, Hayden & Bullock 2015). Clearly, students believed that learning in real-time could improve their understanding and clarify queries they have while caring for patients. Now is the time for Australian nurse leaders to engage in promoting changes in governance

in education and healthcare settings that can enable mlearning *in situ*, at point of care while ensuring patient safety is maintained.

Conclusion

Nursing students demonstrated an understanding of the impact of enabling the use of mobile devices for mlearning in healthcare environments. They recognised there is a need for educational preparation for mlearning within the workplace. Most students were enthusiastic about being able to use mlearning, but understood professional behaviour needs to be modelled when mlearning is deployed. They also have an expectation their educators and supervisors will be competent in its use. Deployment of mlearning as legitimate nursing function requires embedding the use of health technology and informatics in the undergraduate curriculum and nursing leadership to support its use in educational and healthcare environments. Only when there is a change in organisational governance that enables mobile devices to be used for learning and teaching, will the Accreditation Council achieve its aim of promoting and supporting competency, in health technology and informatics in nursing in Australia.

5.5 Commentary on Chapter 5

This chapter highlights the limited governance at individual, organisation and systems levels impacts on learning and teaching at point of care. The lack of policy and guidelines to direct safe and appropriate use of mobile learning in healthcare environments is creating issues for the deployment of mobile learning as a legitimate nursing function. Ability to use or develop competency in mobile learning at an individual level is obstructed at an organisation or systems level and impedes opportunities for nurse supervisors to engage and interact with each other at and away from the workplace.

Nurse supervisors believe using mobile devices for the purpose of learning and teaching is similar to *taking a blood pressure*, inferring access to mobile learning needs to become an integral work practice. The partnership of student, patient and nurse supervisor collaborating or sharing information at point of can be strengthened by using mobile learning strategies because information can be accessed and discussed if appropriate, *in situ*, in real-time rather than away from the bedside. Mobile learning can enhance learning, promote communication, and facilitate rapport development. Modelling appropriate behaviour that ascribes professional identity formation can be shaped through these interactions and empower nurses in positive socialisation of this learning and teaching strategy. Preparation of student nurses to be work-ready is essential and inclusion of this new learning and teaching approach in educational and healthcare settings will assist with the development of safe and appropriate behaviour commensurate with the tenet of the profession of nursing.

Engagement by nursing leadership in Australia is necessary to ensure the transfer of mobile learning from the educational setting into healthcare environments becomes possible. Deployment of mobile learning within healthcare environments depends on change in organisational and systems governance. This change will enable opportunities for patients, student nurses and clinical supervisors to transform learning and teaching at point of care. This chapter contributed to answering the research questions from the individual level perspective of nurse supervisors and undergraduate nurses. Research objective 1 and 2 focus on both registered and undergraduate nurses:

> *RQ1 RO1: To understand the nature and scope of usability of mobile learning in situ, at point of care, by registered nurse supervisors for learning and teaching, informal learning or continuing professional development in healthcare environments?*

The research contributed to answering research question 1, research objective 1 by revealing nurse supervisors understood their responsibilities regarding using mobile technology at point of care if they were able to access mobile learning opportunities. This chapter reports professional identity is modelled by nurse supervisors and the curtailment of mobile learning during work integrated learning impedes development of the formation of digital professionalism of students. Enculturation within

healthcare settings where legitimate use of mobile learning is hidden or rendered inappropriate behaviour will continue to perpetuate the non-sanctioned use of this learning and teaching strategy while inadequate policy development remains. This chapter contributed to answering research question 1, research objective 2 by showing students were fully aware of their responsibility to exclude using mobile or portable devices while undertaking work integrated learning. The objective states:

> *RQ1 RO2: To understand the nature and scope of usability of mobile learning in situ, at point of care, by undergraduate nurses, for learning and teaching, informal learning or continuing professional development in healthcare environments?*

Students demonstrated they wanted to use mobile technology for fast, easy access to digital tools or improve their clinical knowledge using evidence-based contemporary resources. Access and use of mobile or portable devices during work integrated learning was an expectation of future nurses. Students had a strong understanding of potential positive and negative professionalism issues. They also noted the lack of proficiency of end-users was detrimental to their learning and inefficient for patient care. Nursing students accepted that mobile learning was a legitimate nursing function. This research also contributed to answering research question 2, through research objective 2:

> *RQ2 RO2: To understand the organisation impact on governance of mobile learning at point of care?*

Exposing the lack of capacity by nurses to use mobile learning at an individual level highlights the impact an absence of governance at an organisation and systems level. This absence negatively impacts development of digital professionalism as part of professional identity formation. The inability to model appropriate and safe behaviour has contributed to the limited acceptance of mobile learning by nurses in healthcare environments. This absence of direction will maintain the *status quo* and continue to hinder the development of digital professionalism as part of professional identity formation of nurses and student nurses. This chapter provides direction about how to respond to the limited acceptance of mobile learning at point of care for informal learning and CPD.

Chapter 6 Preparing for change in the research domain

Age quod agis

Do what you are doing

(Saint Ignatius of Loyola)

Using mobile learning for informal learning and CPD to augment knowledge acquisition, become digital and ehealth literate and promote modelling of digital and ehealth literacy is a priority for nurse supervisors. This research highlights nurse supervisors understanding of the potential of mobile learning for learning and teaching of themselves and their students. The first publication reports the analysis of six focus groups in relation to the capacity of nurse supervisors modelling mobile learning as a learning and teaching strategy at point of care. The second publication shows nurse supervisors understand and are prepared for change by prioritising how mobile learning can be deployed at point of care. This chapter shows nurse supervisors are prepared to enable installation of mobile learning for learning and teaching, informal learning and CPD at point of care. This chapter is divided into the following sections:

- Section 6.1 provides an introduction to publication 8 which shows nurse supervisors are prepared for incorporating the benefits of mobile learning to advance nursing practice;
- Section 6.2; presents publication - *Modelling Digital Knowledge Transfer: Nurse Supervisors Transforming Learning at Point of Care to Advance Nursing Practice*;
- Section 6.3; provides an introduction to publication 9, which demonstrates nurse supervisors understand and have prioritised how mobile learning can be installed for enabling informal learning and CPD at point of care;
- Section 6.4 presents publication - *Moving Past Exploration and Adoption: Considering Priorities for Implementing Mobile Learning by Nurses*; and
- Section 6.5 provides commentary on Chapter 8 and its contribution to answering research question 1, objective 1.

6.1 Introduction to publication 8

Publication 8 reports on the importance of learning and teaching and modelling digital professionalism of nurse supervisors within healthcare environments. This study reveals nurse supervisors understand the need to remain contemporary in their field by having access to learning and teaching resources. They also realise developing confidence and proficiency in digital and ehealth literacy will enable them to gain evidence of learning that assists with maintaining their registration as a nurse. Nurse supervisors also want to access mobile learning as a strategy to augment learning and teaching of undergraduate nurses whilst they are in practice. The capacity of nurse supervisors to model digital professionalism and expose nursing students to safe and appropriate behaviour while under supervision is a component of expanding knowledge. Guiding and supporting the next generation of nurses by nurse supervisors is a priority. This publication demonstrates that nurse supervisors understand and are prepared to use mobile learning as an adjunct learning and teaching strategy, for informal learning and CPD.

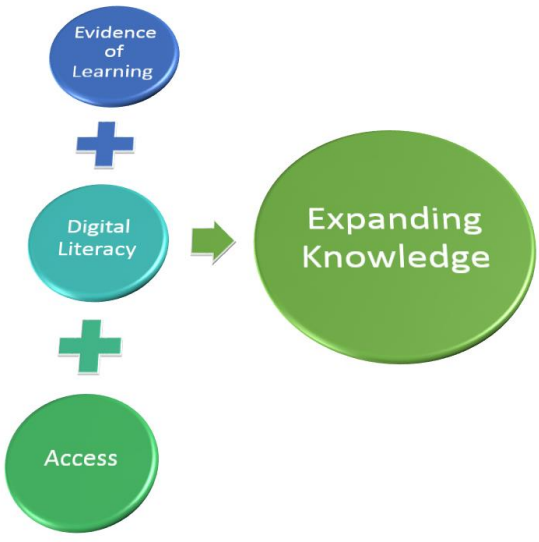
6.2 Publication 8 - Modelling digital knowledge transfer: nurse supervisors transforming learning at point of care to advance nursing practice

Mather, C and Cummings, E, "Modelling Digital Knowledge Transfer: Nurse Supervisors Transforming Learning at Point of Care to Advance Nursing Practice", *Informatics*, **4** (12) pp. 1-14.ISSN 2227-9709, doi:10.3390/informatics4020012 (2017).

Abstract

Limited adoption of mobile technology for informal learning and continuing professional development within Australian healthcare environments has been explained primarily as an issue of insufficient digital and ehealth literacy of healthcare professionals. This study explores nurse supervisors' use of mobile technology for informal learning and continuing professional development both for their own professional practice, and in their role in modelling digital knowledge transfer, by facilitating the learning and teaching of nursing students in the workplace. A convenience sample of 27 nurse supervisors involved with guiding and supporting undergraduate nurses participated in one of six focus groups held in two states of Australia. *Expanding knowledge* emerged as the key theme of importance to this group of clinicians. Although nurse supervisors regularly browsed Internet sources for learning and teaching purposes, a mixed understanding of the mobile learning activities that could be included as informal learning or part of formal continuing professional development was detected. Participants need educational preparation and access to mobile learning opportunities to improve and maintain their digital and ehealth literacy to appropriately model digital professionalism with students. Implementation of mobile learning at point of care to enable digital knowledge transfer, augment informal learning for students and patients, and support continuing professional development opportunities is necessary. Embedding digital and ehealth literacy within nursing curricula will promote mobile learning as a legitimate nursing function and advance nursing practice.

Key words: access; continuing professional development; digital literacy; digital knowledge, digital professionalism; ehealth literacy; informal learning; mobile learning; nursing.



Introduction

Implementation of mobile learning for informal learning and continuing professional development within healthcare settings has been slow. Previous research indicates there are systemic, organisational, and individual impediments that have contributed to this lack of realisation of the

potential to transfer digital knowledge and transform learning at point of care (Mather & Cummings 2015). The focus of this study was to explore nurse supervisor use of mobile technology for informal learning and continuing professional development (CPD) both for their own professional practice and in their role of facilitating student nurses' learning in practice. Nurse supervisors shared their opinions and experiences of how they managed the access and retrieval of information for informal learning of students and CPD using mobile or portable devices.

Royle and Blythe (1998) discussed the use of information systems by nurses to remain current in their field. They reported that nurses show differences in awareness of research and availability of information resources and acknowledged there was a need for collaboration among healthcare organisations and academic institutions, leading to a global healthcare community. They predicted in the future there would be a need for "improved organisational and environmental support for nurses to work with increasingly sophisticated information systems" (Royle & Blythe 1998). The changes outlined by Royle and Blythe (1998) have emerged in nursing practice, and it is now imperative for nurses to be both digitally and ehealth literate within healthcare environments. Similarly, it is essential for nurse supervisors to be digital and ehealth literate to promote digital knowledge transfer, so they are able to model digital professionalism with students in the workplace (Mather & Cummings 2015).

The Australian National Statement on Health Literacy (Australian Commission on Safety and Quality in Health Care 2014) defines health literacy within an individual or environment context. Individual health literacy pertains to the capacity of a person to access and utilise information to formulate healthcare decisions and actions. Health literacy environment refers to elements that comprise the health system including the infrastructure, policies and resources that influence how people interact with, and apply health information and services (Australian Commission on Safety and Quality in Health Care 2014). The addition of the dimension of digital or electronic health literacy, known as ehealth literacy, provides further complexity to this concept. As digital technology has evolved, the need for supporting digital and ehealth literacy of the health profession workforce and with patients to enable digital knowledge transfer has also increased.

Digital professionalism has emerged as a component of professional identity formation of health professionals, as they need to behave appropriately when using technology within healthcare environments. An element of this new literacy is the opportunity to undertake informal learning and CPD at point of care, in real time in the workplace. Understanding the factors that affect the capacity of nurses to transform learning using mobile technology at point of care needs to be considered. Harnessing digital literacy and embedding ehealth literacy into nursing courses, and promoting modelling of digital professionalism to promote digital knowledge transfer, will support the acceptance and use of mobile learning for informal learning as a legitimate nursing function in healthcare environments (Mather & Cummings 2016). Transformation of learning and teaching to enable transfer of digital knowledge, through the inclusion of mobile learning into everyday nursing practice, will ensure nurses have options to advance nursing practice by accessing current evidence-based information as required (Mackay, Anderson & Harding 2017; Risling 2017).

Acknowledgement of a changing world where mobile technology is ubiquitous in the environment enables opportunity for the nursing profession to be innovative and remain a contemporary discipline. The Nursing and Midwifery Board of Australia provides impetus for enabling nurses to harness mobile technology for capturing informal learning in the workplace as part of CPD required for annual registration as a nurse (Nursing and Midwifery Board of Australia 2016d). The Australian Nursing and Midwifery Accreditation Council mandates that all accredited nursing programs are required to include nursing informatics (Australian Nursing and Midwifery Accreditation Council 2012, 2014). These standards further support using digital strategies for CPD and the development of digital professionalism by stating that health technology and informatics need to be embedded at a technical, contextual, and emancipatory level (Australian Nursing and Midwifery Accreditation Council 2014). The impact of mandatory CPD for nurses is being realised, and recognition of flexibility in learning opportunities to include new strategies is necessary to consider different situations and learning styles (Ross, Barr & Stevens 2013).

Nurses undertake CPD using a range of educational strategies including traditional methods such as face-to-face attendance at workshops and conferences or completion of online learning packages. The proliferation of digital media choices has expanded to include proprietary software including applications known as apps, and portfolios to enable nurses to document and store evidence of CPD. Commercial apps provide prompts to ensure users meet their own goals for CPD, plus tracking and reminder systems including letting users know how much CPD they have undertaken. Professional bodies, societies, and non-profit organisations provide free or for-fee CPD options. These portals also support documentation of other CPD undertaken external to the platform (AUSMED 2017; Chandler 2017; Health Education and Training Institute 2017; iFolio 2017). Professional (Australian College of Nursing 2017; Australian Nursing Federation 2013) and healthcare organisations (Calvary Healthcare 2017; North Coast Primary Health Network 2017) provide contemporary information on local intranets that support nurses completing their annual CPD requirements.

Investigation of the information-seeking behaviour of nurses reveals that, at point of care, nurses pursue information about post-treatment follow-up or recovery. They also access and retrieve information about health assessments, problems, disease, treatment of patients, and other allied health disciplines (Singh & Mahapatra 2016). This means nurses can now access information at point of care in real time, rather than needing to go to a library, a nurses' station, an office, or a university campus or to return home before being able to search for the information required. However, preparation and training within nursing courses, and easy access to and availability of the Internet in the workplace is required to enable convenient, timely access to information that can improve health outcomes of patients and augment nursing practice by promoting transfer of digital knowledge in the workplace (Maloney et al. 2013; Singh & Mahapatra 2016).

Access to web-based information or intranets can assist nurse supervisors instructing student nurses with decision-making. Nurse supervisors need to model access and use of high-quality reliable Internet sources. Factors that influence trust judgements of health information relate to individual and website factors.

A previous study (Cader, Campbell & Watson 2009), which explored the ways in which nurses discern credible information, found they used tacit, process, and propositional knowledge, as well as intuition. Nurses employed quasi-rational cognition and analysis to appraise evidence to judge webpage quality. They also used cues of accuracy, relevance, completeness and amount of data provided before deciding whether the information was credible or reliable.

Furthermore, socio-demographic, personality, health status, and level of health literacy impact on trust judgements of individuals. Prior experience, perceived reputation, risk, and familiarity also swayed determination of information (Kim 2016). Lack of time increased the risk of nurses utilising lower quality Internet sites for information (Cader, Campbell & Watson 2009; Klein 2002). However, Yang and colleagues (Yang, Thompson & Bland 2014) found that, in simulated conditions, nurses reason adaptively in time-limited situations and make judgements without compromising accuracy of outcomes (Yang, Thompson & Bland 2014). Enabling easy access to web-based health information can reduce time pressure, support decision-making, and maintain judgement accuracy at point of care (Yang, Thompson & Bland 2014).

The preparation of students to retrieve and assess Internet health information and discern credible Internet sites needs to be overtly included in the curriculum, the classroom, and practised prior to going into the workplace (Cummings et al. 2016; Scott, Gilmour & Fielden 2008). Perhaps more importantly, nurse supervisors require preparation to facilitate proficiency in digital literacy and ehealth literacy to ensure there is consistency in approach to modelling access and using web-based or Internet-enabled information for digital knowledge transfer to students in healthcare environments (Arrigoni et al. 2016; Solvoll, Terje et al. 2016). Preparation of nurse supervisors to be competent and confident in using mobile technology in the workplace for learning and teaching can augment learning opportunities and influence student satisfaction of their healthcare experiences (Papastavrou et al. 2016).

Since the advent of easy, convenient access to information through the Internet, patients or consumers have become participants in their own care. A new aspect of the role of nurse supervisors is to model

patient inclusion and education, and assist with promotion of digital and ehealth literacy. Nurse supervisor proficiency in digital and ehealth literacy and modelling digital knowledge transfer as a component of digital professionalism assists with facilitating rapport development and mutuality of understanding between students and patients that can create positive learning environments (Mather & Cummings 2015).

Change in nursing practice now includes knowledge management, and digital and ehealth literacy is imperative for nurse supervisors. The opportunity to transform learning at point of care to advance nursing practice using mobile learning is here. Understanding how to model digital professionalism for informal learning and CPD in the workplace will require engagement with the process of change, to enable the safe and appropriate use of mobile learning in the workplace. Entrustment to use credible web-based resources informal learning and CPD at point of care is also necessary, to ensure appropriate modelling with students and to encourage the formation of a positive professional identity during healthcare experiences (Mather & Cummings 2016).

Materials and Methods

Recruitment for the study was through convenience sampling of nurse supervisors employed by one Australian university. Invitations to participate were emailed to all nurse supervisors employed in a range of healthcare settings who were involved with guiding and supporting undergraduate students from the University in two Australian states. Twenty-seven nurse supervisors elected to be participants in one of six focus groups. The focus groups were conducted between July and November 2014. The focus groups included between three and seven nurse supervisors, with approximately half of the participants from each State (13 from New South Wales and 14 from Tasmania). Focus group sessions were held on three university campuses (one in New South Wales and two in Tasmania) and were approximately 1 hour in duration, audio-recorded, and transcribed verbatim.

This exploratory study aimed to investigate nurse supervisor's use of mobile technology for informal learning and CPD, both for their own professional practice and in their role of facilitating learning and teaching of nursing students in the workplace. Therefore, the focus group sessions opened with specific questions about mobile technology and its use by the nurse supervisors. This approach then prompted discussion to elicit information about mobile learning strategies used by nurse supervisors in the workplace. Free discussion ensued from the initial questions and focussed on strategies they used for CPD with additional prompts to elicit information about how they used mobile learning. Within this exploratory framework, participants discussed their current CPD practices.

Thematic analysis was undertaken independently by two researchers followed by discussion and cross-checking of themes and sub-themes to reach consensus. Ethics approval for this study was gained through the Tasmanian Human Research Ethics Committee, approval number H0013729.

Results

Participants were nurse supervisors who guided and supported undergraduate nurses from one university within a range of healthcare settings, during work integrated learning, as part of their undergraduate degree. The nurses who participated in these focus groups had previously supervised nursing students. More than half the participants had supervised students for more than five years. Of the Tasmanian cohort, approximately half of the participants practiced in community settings and half were from tertiary healthcare facilities, whereas participants from New South Wales, Australia, were employed as nurse supervisors in both settings. Other participant demographic characteristics were not recorded.

Thematic analysis of the focus groups indicated nurse supervisors constantly associated learning and teaching with access and use of mobile technology for digital knowledge transfer at point of care. Through this linkage, the theme of *Expanding Knowledge* emerged as key. Using mobile technology to expand knowledge and support learning opportunities was a priority expressed in all focus groups. Overt enthusiasm was displayed by nurse supervisors for the potential of using Internet- and web-

based resources to access and retrieve information, construct knowledge, verify information, and share learning in real time with students or patients while in the workplace.

Participants also indicated informal learning and CPD were enabled by using mobile technology at point of care. Discussions regarding how to utilise this new andragogy to assist with meeting their annual requirements for CPD as evidence of learning ensued. Lack of confidence in using mobile technology or lack of digital and ehealth literacy was of concern to this group of nurses. Access to mobile learning varied due to organisation policy and data, and local rules at point of care was also a focus of discussion. They were keen to remain up-to-date in their role by modelling appropriate behaviour when accessing mobile technology for learning purposes.

Participants were aware of the potential overload of information available to learners and were keen to access relevant information at their convenience as required. One participant (Focus Group 1) acknowledged the following:

> *"I think we need to continue. The world is changing. The world is becoming more and more mobile. We as a profession need to adapt and keep up with that as well. We need to be constantly looking up because we don't know everything. We can't possibly know everything. We have to continue to research. I'm very pro having the mobile technology".*

The three sub-themes of *evidence of learning*, *digital literacy*, and *access* are integral for learning and teaching at point of care. These sub-themes support the emergent key theme of *expanding knowledge*. *Expanding knowledge* was important to nurse supervisors as being able to access informal learning in real time or undertake CPD using mobile learning opportunities were acknowledged to be of value. Participants understood digital and ehealth literacy was fundamental to modelling digital professionalism and enabling digital knowledge transfer with students. They also realised lack of access to mobile technology at point of care contributed to hindering ingress to this learning and teaching strategy. Each of the sub-themes of *evidence of learning*, *digital literacy*, and *access* is explained in detail below.

Evidence of Learning

Evidence of learning includes informal learning moments and CPD activities that promote nurses, students, and patients to gather and interpret information to enable the construction of knowledge. Utilisation of these situated learning opportunities may or may not be documented to show evidence of learning. Intangible evidence of learning are the behavioural changes that result from linking theory with practice, which enables comprehension and development of meaning as the learner understands and creates new knowledge. Formal documented evidence of learning by nurses is expected through the identification of learning needs, an action plan, and reflection, are also required annually as part of maintaining registration as a nurse.

Within the sub-theme *evidence of learning*, participants indicated that the drive for meeting their formal CPD requirements as evidence of learning and maintaining contemporary in their field was constant. Nurse supervisors were keen to participate in easily accessible CPD topics that were identified as part of their annual learning plan. They initially acknowledged CPD *"they're all online"* (participant, Focus Group 6), but also reported undertaking other types of in-service training that included face-to-face sessions and conference attendance.

Participants indicated mandatory CPD was the focus of much of their documented online learning with one participant stating:

> *"all our mandatory competencies now are pretty much online"* (participant, Focus Group 4).

Expanding upon the range of digital mandatory CPD requirements, the participants offered a wide range of topics they had completed as part of their formal CPD. Participants reported the types of web-based resources they accessed. One nurse supervisor (Focus Group 4) stated:

> *"There's hand hygiene, there's manual handling. There's basic life support so that would be two, 3.5 hours there. There's smoking cessation, there's another half an hour, there's four".*

At some organisations participants could undertake CPD using the staff intranet. Provision of this digital platform enabled them to complete their annual mandatory training online. Participants mentioned they accessed or purchased online CPD packages offered by professional bodies or commercial organisations. Participants also disclosed undertaking a range of free formal CPD opportunities offered by societies or organisations. This type of CPD enabled participants to gain evidence of their learning. One nurse supervisor (Focus Group 4) divulged:

> *"So you go in there, you login, you can look up the article, read the article they are usually only one or two pages… then you go back in and click on another link and there's a quiz that pops up and gives half an hour or an hour's worth of CPD points… its free".*

Flexibility of undertaking online informal learning or CPD was acknowledged. One participant (Focus Group 2) noted:

> *"I guess it's a convenience, you don't have to take time out to go to the venue, if you can find something equally as interesting online".*

Nurse supervisors had considered informal learning opportunities could be included as CPD as evidence of learning and indicated they were satisfied to *"learn as you go"* (participant, Focus Group 2). Nurse supervisors indicated they were aware that, for learning to be included as CPD, it needed to be recognised as new knowledge:

> *"if there's something new in in it you can count it, if it's something you've learnt"* (participant, Focus Group 6).

Regarding the documenting of informal learning, nurse supervisors reported: *"I thought we had to"* (participant, Focus Group 5), whilst another participant mentioned they had *"not even considered it [informal learning] to be honest until you said that"* (participant, Focus Group 3) when discussing using Internet- or web-based informal learning for inclusion as CPD. Those participants who understood informal learning could contribute to formal CPD as evidence of learning expressed statements such as the following:

> *"It's meant to be about a point an hour of learning, so we'd smash it"* (participant, Focus Group 4) and: *"I think that's why I haven't bothered to keep up with writing everything up because that's what I would do if I got audited"* (participant, Focus Group 3).

Nurse supervisors could foresee that students could augment learning by having access to informal learning opportunities and sharing their learning via digital knowledge transfer at point of care:

> *"I think it's a useful tool to have at their disposal and I think they are lucky to be able to do that. It's at their fingertips so they should be able to get answers very quickly, which I think is great for them. I know they do a lot of group chats and things… if they could put up something on that group chat at the time of how they're feeling, something they've discovered. I think being able to communicate between each other is a really good thing"* (participant, Focus Group 2).

Evidence of learning was important to nurse supervisors. They indicated facilitating the construction of knowledge was integral to their role as nurse supervisors. However, they also recognised learning in real time could be of benefit to other nurses, students, and patients. Although completing formal CPD was a focus, verification of learning was not limited to documented evidence required for maintenance of registration. This group of nurses indicated that informal learning and facilitating learning using mobile technology also supported opportunities to construct new knowledge that was evident through less tangible means, such as behaving in a digital professional manner.

Evidence of learning is important in demonstrating *expanding knowledge* at point of care using mobile technology. This sub-theme provides a means by which nurse supervisors can systematically demonstrate and record their learning. This sub-theme directly relates to each of the other sub-themes, as for *evidence of learning* to be achieved the nurse supervisors must also demonstrate *digital literacy* and have appropriate *access*.

Digital Literacy

Nurse supervisors identified that *expanding knowledge* was enhanced by developing their own digital and ehealth literacy. The sub-theme of *digital literacy* encompassed competency or capability of individuals in using digital technology for learning and teaching. Nurse supervisors also indicated that ehealth literacy includes knowing how to find clinical or health-related information using mobile technology formed a component of digital literacy. Both of these elements contribute to enabling *expanding knowledge*.

Participants reported accessing most of their learning using digital platforms. They were concerned about their level of digital and ehealth literacy. From focus group discussions, it was evident there was a range of levels in confidence and skills in accessing and retrieving information from the Internet using mobile technology. Participants were also aware as part of their role to enable digital knowledge transfer they needed to be digital and ehealth literate. Nurse supervisors indicated they were expected to model appropriate competency and appropriate behaviour in using, and teaching others how to use, mobile technology for access and retrieving credible information from the Internet.

Nurse supervisors recognised their digital literacy proficiency was inadequate at times. One participant noted:

> *"when I first came out of uni they didn't believe I was computer illiterate. They thought I was joking*" (participant, Focus Group 5).

Nurse supervisors also realised that continued use and exposure to digital technology maintained proficiency in digital literacy:

> *"No I don't do it enough. It's one of those skills that if you don't use it all the time you lose it… unless I'm playing around it (skills) drop off dramatically"* (participant, Focus Group 3).

To gain knowledge or maintain digital literacy, participants also mentioned seeking assistance from family members when they had technology issues.

> *"I mean there are some things I am not confident with, but there's usually a way around it and you can ask one of your friends or something, someone always knows"* (participant, Focus Group 1).

Digital literacy impacted on participants' capacity to gain evidence of learning. Nurse supervisors' level of knowledge and skills in relation to the digital world was of concern to them. They realised there was inconsistency in their knowledge, and had variable access to opportunities to improve their level of proficiency in digital and ehealth literacy.

Participants recognised they could facilitate and augment learning opportunities if they were confident and competent in guiding students or patients in using mobile technology for digital knowledge transfer. Nurse supervisors were keen to capitalise on informal learning opportunities with students and patients at point of care. They provided examples of how using mobile learning in real time could be of benefit to learners. One participant (Focus group 4) stated:

> *"Something comes up. You think, Oh that's really good. I have something here. Now that we're talking about it or doing it, look at this. Then it'll make more sense and things like that. Then you can just do it there, especially as a facilitator, so it's immediate".*

Nurse supervisors were aware that some patients were digitally literate and believed that there was an onus on them as healthcare providers to guide these patients in finding credible health information:

> *"I mean the older patients have their mobiles and they're on them all day. They've got their apps and stuff like that"* (participant, Focus Group 1).

Participants also indicated that the promotion of digital and ehealth literacy of patients could be undertaken by nurses if they were digitally literate. One participant stated:

> *"For a patient I think it's different if they've said can you tell me and you might say let's look it up together. I think that's different than if it's just your personal learning needs"* (participant, Focus Group 6).

Nurse supervisors also articulated concerns of the potential for inappropriate behaviour of 'staring at screens' and 'not being present' when using mobile or portable devices at point of care. Nurse supervisors were keen to be digital and ehealth literate and able to model digital professionalism with students. One participant revealed (Focus Group 3):

> *"even just not ignore the patient and have everybody staring at a screen talking about them rather than to them".*

Participants were keen to acknowledge patients during learning interactions. They realised that using digital technology at point of care provided opportunity to include patients in their own care and promote patient-centred care. Being digitally literate facilitated learning of patients. One participant (Focus Group 2) indicated:

> *"So whenever I look at these things I've always attempted to integrate interpersonal contact with the patient as well because I'll be able to see that they're sitting there feeling like, oh well, may as not be here. So I think it's something that needs to be taught that these things can affect and to try and bring it back to some patient-centred interaction".*

Participants announced they would like to be more educationally prepared to be digitally literate to enable them to model digital professionalism with students. Nurse supervisors from different focus groups commented:

> *"If you're not computer savvy…" "Work has never given me time to learn computers, IT stuff"* (participant Focus Group 6),
>
> *"we're struggling with it because we haven't been educated"* (participant, Focus Group 4), and
>
> *"we need training and development to be able to provide us with something like that"* (participant, Focus Group 6).

Participants suggested not only did they need educational preparation in using mobile or portable devices, they also required knowledge about accessing credible websites. Participants indicated that, through the educational preparation process, they could learn about how to use digital technology and what resources were available to seek, retrieve, and transfer knowledge to students or patients:

> *"as part of your learning you would be using reputable sites as well"* (participant, Focus Group 3).

Participants indicated this dual educational strategy would support development of nurse supervisor proficiency in digital and in ehealth literacy. Participants also noted the wide range of resources available on the Internet and discussed the lack of consistency of resources. Nurse supervisors developed their own solutions to the myriad of digital educational resources available; for example,

> *"the hospital if we went electronic that they could probably give us an update of which sites are the ones to be using"* (participant, Focus Group 4)

and *"the top 10 sites"* (participant, Focus Group 3).

Other participants were aware they needed to guide students in developing digital professionalism, including ensuring students were aware of credible sources of health information. This function of supervision relied on them having sufficient digital literacy to be able to guide students.

> *"I guess you just want to make sure they're going to good sites, legitimate sites"* (participant, Focus Group 3).

> *Nurse supervisors were keen to ensure students did access credible sources of information.* A participant (Focus Group 2) observed:

> *"The problem is who has the time to go on the sites to see what they're looking up".*

To model digital professionalism to students and patients, nurse supervisors revealed they vetted Internet resources such as YouTube clips for suitability. One participant stated, due to the lack of suitable resources, *"I make up my own"* (participant, Focus Group 2).

Consistency of resources was mentioned, with one nurse supervisor suggesting the following:

> *"I think it would be lovely if we had a suite – not to re-invent the wheel, but if there were credible ones out there, so you could get a suite together of stuff so everyone was consistent in what they were showing students"* (participant, Focus Group 2).

Participants indicated they wanted the best educational outcomes for their students and being digital and ehealth literate enabled them to model digital professionalism confidently within healthcare settings.

Nurse supervisors were aware of their role in supporting other nurses as well as students. They understood part of their function as teachers, was to promote and support digital and ehealth literacy of their peers. They also realised there was a mutuality of understanding that could develop, as students could impart their digital knowledge to preceptors and patients, while increasing their health knowledge through participating in the care of patients at point of care:

> *"I can see there would be problems with how preceptors feel about it and how they assist the students to use it because I don't think they would be 'au fait' with and up-to-date with how to use it as well. You're teaching the preceptor. It's not so bad because then you've got the preceptor giving information and then the student providing information as well"* (participant, Focus Group 5).

Analysis indicates that digital literacy is critical in contributing to expanding knowledge. Being able to utilise digital platforms proficiently is fundamental to their role. The ability to use digital technology at point of care for learning and teaching purposes was also important in contemporary nursing practice for enabling digital knowledge transfer and expanding knowledge.

Access

Access in this context refers to nurses, nurse supervisors, students, or patients having access to the Internet via mobile technology to seek or retrieve health information at point of care. The sub-theme of *access* was recognised by participants as being integral to enabling digital knowledge transfer at point of care.

Participants indicated the ability to undertake informal learning or CPD using mobile or portable devices was dependent on ingress to the Internet or local intranets at point of care. Nurse supervisors were conversant with options available to access learning and teaching resources for informal learning and CPD. They had a strong understanding of the limitations of accessing information while in the workplace. Participants reporting mobile applications or apps to support learning using organisation intranets were not supported, and retrieving information in the workplace was often possible only by accessing a desktop computer:

> *"Yeah I think the only frustrating thing is it's time-consuming … and getting access to computers"* (participant, Focus Group 6).

Use of organisation provided wireless Internet services is restricted in some Australian healthcare settings. Nurse supervisors grappled with using sanctioned intranet resources, which may be limited. One participant stated:

> *"some stuff the students want to know about is not on the intranet. It's on the Internet. So you can't Google it because it won't allow you"* (participant, Focus Group 1).

They indicated that the majority of access to the Internet for informal learning at the workplace was undertaken using their personal mobile devices, at their own cost. For example:

> *"well you end up using your own (data), yeah. Then it comes down to data usage. You might only have one 'gig' of data on your phone and then you're limited"* (participant, Focus Group 1).

Participants suggested there was a lack of consistency in access to mobile learning, that was confusing in the workplace as expectations of staff and students were incongruent. They indicated that, in some healthcare settings, they are bound by organisational policy that precluded the use of mobile technology at point of care. However, it could be argued that the role of learning and teaching is different to being part of a workplace where each nurse has a patient allocation or workload. These nurse supervisors suggested they should be able to access mobile learning at point of care because their main focus is learning and teaching rather than patient care. This participant revealed:

> *"I think a lot of those policies and procedures are aimed at people who are there in the clinical workforce, so the concern is you're doing personal stuff on your phone, rather than looking after patients. Whereas we don't have a patient load, our responsibility is towards the student, so using our own personal device to get information to facilitate the learning of the student, I think that's a different sort of situation altogether"* (participant Focus Group 5).

Access issues also related to equipment. Provision of appropriate mobile technology, weight of devices and theft were also issues raised by participants. Appropriateness of mobile devices for learning and teaching were also discussed. One nurse supervisor stated:

> *"The mini (Ipod mini) would be useful because of the weight that we do carry… trying to show to more than three people, they're not big enough"* (participant Focus Group 2).

Access is integral to digital knowledge transfer as part of *expanding knowledge*. No access to mobile learning at point of care renders digital or ehealth literacy irrelevant. Without digital access, nurse supervisors are unable to use this new andragogy to guide and support students undertaking work integrated learning, nor can they promote patient engagement with their own care. Informal learning and CPD is an implicit function of being a nurse. Being able to utilise mobile technology at point of care supports digital and ehealth literacy, promotes evidence of learning, and provides opportunities for expanding knowledge.

Discussion

Nurse supervisors understand learning and teaching strategies are changing, evidenced by their own disclosure of types of formal CPD undertaken to meet their annual requirements for registration. Evidently, some were more conversant with activities that could be included as CPD, while others continued to utilise more traditional methods such as face-to-face workshops or conferences. However, most participants accessed online learning packages to complete their mandatory organisational CPD requirements. Ross and colleagues (Ross, Barr & Stevens 2013) previously indicated that mandatory CPD for Australian nurses would impact their practice, and this study demonstrates that nurses utilise the range of resources available to them to maintain their registration.

Coupled with the continued growth of mobile technology in personal and professional life (Pauleen et al. 2015) the requirement for mandatory CPD has created pressure within organisations that informal

learning using a mobile or portable device be extended and accepted as a legitimate method of learning within the workplace (Misko, Beddie & Smith 2007).

This study demonstrates the need for further preparation to ensure nurse supervisors are digitally literate and proficient in using mobile technology to facilitate mobile learning activities. Preparation includes becoming confident and competent in using mobile or portable devices and being able to discern appropriate Internet resources suitable for learning and teaching purposes. Nurse supervisors in this study indicated they would like to become more digital and ehealth literate, admitting at times that they struggle with using the Internet, especially as no educational preparation in using digital technology for transfer of digital knowledge is provided during work hours.

Patients and the next generation of nurses are beginning to expect to use mobile technology at point of care (Risling 2017), but to achieve this nurse supervisors need the ability to guide students to develop digital professionalism by modelling appropriate behaviour. Currently, they do not have the time or inclination to constantly check what information students access, suggesting that appropriate utilisation of mobile technology for informal learning needs to start early in the nursing curriculum (Cummings et al. 2016).

Congruency of instruction on and off campus regarding mobile learning will promote proficiency in digital and ehealth literacy of students that can be translated to digital knowledge for assisting patients at point of care. Additionally, development of digital professionalism as part of professional identity formation will foster entrustability of the next generation of nurses, which will assist with the maintenance of a high reputation of nurses as a professional group (Morgan 2016).

Nurse supervisors are motivated to complete their annual CPD requirements and use 'pull' learning to access what they need as they need it, to achieve their aims (Shackleton-Jones 2012). Mobile learning in the workplace has the capacity to transform learning, through the transfer of digital knowledge at point of care, as nurses can access and retrieve information in real time without leaving the patient. Motivation to obtain information is typical of informal learning where information is required to enable rapid adaption or use. This behaviour reported by Yang and colleagues (2014) demonstrated that nurses reason adaptively.

Empowerment of learners is possible when access to mobile learning is available as they access and retrieve information and construct knowledge in real time (Mather & Cummings 2015). Furthermore, access to Internet-enabled learning within healthcare environments promotes patient-centred care and student-focussed learning. However, nurse supervisors in this study reported a lack of consistency in accessing the Internet or capacity to use mobile or portable devices proficiently in the workplace, hindering support of their own and student learning at point of care. Nurse supervisors indicated they wanted change to enable access to information for enabling transfer of digital knowledge to facilitate patient-centred care and harness student-focussed learning.

Study findings indicate that nurse supervisors are engaged in high quality learning outcomes for their students. These nurses found, vetted, and developed their own online resources to assist with learning and teaching of students in the workplace. Additionally, they are prepared to use their own devices, at their own cost, to ensure students have access to timely information to advance their nursing practice. Previous studies have reported that, although the use of mobile learning is generally *ad hoc* within healthcare settings, nurse supervisors are aware of the potential of this as a strategy to augment traditional learning and teaching methods (Mather & Cummings 2015).

Change is slow and there is impetus for nurse leaders and organisations to progress support for learning in the workplace to facilitate learner-focussed education in contemporary healthcare environments. Acknowledgement by nurses for consistency in accessing and using Internet resources will enable dialogue about developing standards and codes of conduct for guiding mobile learning access and use in healthcare environments.

This study supports the notion that nurses and students would benefit from guidance in using mobile technology within healthcare settings. A clear direction about access and use of digital technology to promote digital and ehealth literacy would support the development of confidence and competence of nurses, facilitate development of digital professionalism of students, and enable guidance of digital

and ehealth literacy of patients at point of care. Implementation of mobile learning has the capacity to model digital knowledge transfer, transform learning, and advance nursing practice in the workplace. Prioritisation of a plan for action to enable mobile learning for *expanding knowledge* using mobile technology within healthcare settings will enable this new andragogy for learning, promote completion of CPD, and enable best clinical practice for students and supervisors.

Conclusions

Mobile technology use in everyday life continues to increase, creating pressure for nurse supervisors to be adequately prepared and proficient in using mobile technology in the workplace. Nurses in healthcare settings need to understand informal learning at point of care can be included as a form of CPD. They need to be supported, encouraged, and prepared to become proficient in using mobile technology, so they can model the transfer of digital knowledge and appropriate behaviour with the next generation of nurses. Nurse supervisors must be proficient in modelling digital professionalism when accessing mobile technology for learning and teaching in the workplace. Preparation includes being able to access, retrieve, and discern credible information from the Internet in real time. Modelling appropriate behaviour includes being confident and competent in using mobile technology to promote the digital and ehealth literacy of patients.

This study found *expanding knowledge* was hindered by a lack of access to mobile technology that needs to be ameliorated, to enable mobile learning to become an adjunct to traditional learning and teaching methods at point of care. Preparation of the environment for students is vital for implementation of this innovation. Nurse supervisors acknowledged their role in guiding and enabling students to become work-ready by being prepared and proficient in accessing and retrieving information in real time, and decision-making about when it is safe and appropriate to do so. This includes ensuring students and nurses have digital and ehealth literacy commensurate with being able to undertake online CPD and have ehealth literacy levels to participate in informal learning at point of care. Prioritisation of issues for progression of being able to transfer digital knowledge using mobile technology to enable *expanding knowledge* within healthcare settings, will require nurse leaders to effect change in organisational policies, to recognise mobile learning as a legitimate nursing function.

6.3 Introduction to publication 9

The second publication in this chapter discusses the confirmation of findings from the previous study by a sub-group of participants of the first focus group study. This publication is an analysis of the discussions prompted by the activities undertaken during this session. Focus group participants undertook four activities to elicit further information about using mobile technology for mobile learning in their role as nurse supervisors. This publication discusses the organisation and systems level impediments that need ameliorating if nurse supervisors are to remain contemporary in their role and function as leaders of learning and teaching within the workplace.

6.4 Publication 9 - Moving past exploration and adoption: Considering priorities for implementing mobile learning by nurses

Mather, C and Cummings, E, "Moving Past Exploration and Adoption: Considering Priorities for Implementing Mobile Learning by Nurses", *Studies in Health Technology and Informatics*, **241** pp. 63-68. doi:10.3233/978-1-61499-794-8-63 ISSN 0926-9630 (2017).

Abstract

Successful implementation of mobile technology for informal learning and continuing professional development within healthcare settings cannot be achieved or sustained, until end-users recognise that

the benefits of using this innovation outweigh the issues of non-use. At a systems level there is a need for standards, guidelines and codes of conduct to support deployment of mobile technology at an individual level. The aim of this research was to explore findings of a previous focus group study to elucidate priorities for action, provide evidence and focus impetus for advocating progression of the installation of standards and guidelines at an organisation level. The study confirms nurse supervisors' preparedness and readiness to employ mobile learning at point of care. However, successful implementation requires organisations engaging with, and embracing the evolving digital landscape, and supporting this new andragogy. Organisational level commitment will promote contemporary nursing practice, support the best clinical outcomes for patients, and provide educational support for nurses. Nurse leaders and professional bodies must drive and guide development of robust standards, guidelines, and codes of conduct to prioritise mobile learning as a component of digital professionalism within healthcare organisations.

Key words: Continuing professional development, digital professionalism, implementation framework, informal learning, leadership, mobile learning, nursing, standards.

Introduction

Registration as a nurse in Australia includes a commitment to completing annual continuing professional development. Enabling nurses to augment their mandatory professional development requirements while in the workplace can provide new learning opportunities and positive outcomes (Ross, Barr & Stevens 2013). The rapid growth of mobile technology and rationales for limited adoption of its use in healthcare environments has been explored (Mather & Cummings 2015). Barriers, challenges, risks and benefits of using this technology for clinical, administrative, research and education have also been well-documented (Eley 2008; Gray et al. 2014). Application of an implementation framework (Fixsen et al. 2005; Ogden & Fixsen 2015) demonstrates the limited adoption of mobile learning at point of care for nurses. The lack of leadership by nursing profession bodies and lack of acknowledgement by healthcare organisations in understanding the potential value of mobile learning to support nursing practice and improve patient outcomes persists (Mather, Gale & Cummings 2017). Currently the implementation of mobile learning as a legitimate nursing function in Australia is stalled at the exploration and adoption stage (Fixsen et al. 2005). Initiation of access to mobile technology at point of care will remain fraught while professional bodies and organisations disregard supporting implementation. Ignoring the need to develop standards, guidelines, codes of conduct and policies to enable installation of mobile technology at point of care prevails (Mather & Cummings 2015). This lack of preparedness will continue to hinder the installation stage of this new andragogy (Fixsen et al. 2015; Yagasaki & Komatsu 2011).

The release of the new Australian Registered Nurse Standards for Practice and Continuing Professional Development Standard omit any direct reference to the use of digital technology in nursing (Nursing and Midwifery Board of Australia 2016c, 2016d). At an individual level this lack of guidance hinders deployment of this technology for enhancing nursing practice and potential for improving patient outcomes at an organisation level. Impedance of mobile learning in the workplace will dissuade the development of digital professionalism and promote 'workarounds' for learners in healthcare settings (Mather & Cummings 2015). Further progression of the stages within the framework will be unachievable until there is readiness by the purveyors and stakeholders to transition to a state of preparedness for installation within the implementation framework (Fixsen et al. 2005).

Opportunities exist to create change, garner acceptance, and enable nurses to transition from the current situation to the installation stage. It will require leadership (Yagasaki & Komatsu 2011); harnessing of change champions (Shea & Belden 2015); advocacy for involvement in the development of standards, guidelines and codes of conduct; and the inclusion of nurse leaders in partnerships with stakeholder organisations to ensure mobile learning by nurses becomes accepted as a legitimate nursing function (Guri-Rosenblit 2006; Noordegraaf, M 2015; Shariff 2015). Moreover, drivers of this process within organisations includes nurses who have moved into managerial or educational roles and retain leadership influence within their professional group. These nurses are known as professional hybrids (Croft, Currie & Lockett 2015; Currie, Koteyko & Nerlich 2009;

Kuipers et al. 2014). Nurse supervisors are responsible for guiding and supporting the next generation of students towards work-readiness. They are role models for students who mimic their behavior (Mather, Cummings & Nichols 2016). Modelling digital professionalism is essential for ensuring undergraduate nurses understand and develop appropriate attributes to promote formation of positive professional identity (Mather, Cummings & Nichols 2016). Enabling nurse supervisors to model safe and appropriate behaviour when using mobile technology for informal learning and continuing professional development is vital (Mather, Cummings & Nichols 2016).

This publication reports on a study undertaken with a cohort of nurse supervisors, aimed at exploring findings of a previous focus group study (Mather & Cummings 2017; Mather & Cummings 2015). The purpose was to clarify priorities for action that could be used by these hybrid nurse leaders to provide evidence and focus impetus, for advocating the development of standards and guidelines necessary, to support progression to the installation stage within the implementation framework at an organisation level. This study provides confirmation that nurse supervisors are prepared and ready to initiate mobile learning at point of care. Successful implementation of mobile learning by organisations requires engagement with, and embracing of, digital technology to support this new andragogy. Commitment at organisational level will promote contemporary nursing practice and support the best clinical outcomes for patients and educational support for nurses.

Method

Participants were invited to attend a workshop where results of the previous research were presented. The emergent themes were introduced to a group of 15 nurse supervisors who had participated in the focus group research. Participants then undertook activities to explore and expand upon the findings, and to enable identification of priorities for focus in the next phase of the research.

Each participant was presented with cards describing the themes that emerged and requested to rank them in their preferred order of most to least important. The lists were photographed and tabulated to explore the priorities of the group. The results of this activity regarding how they could progress the use of mobile learning in the workplace were listed on a whiteboard and discussed. Lastly, a pre-formatted prompt sheet was distributed, so participants could list the perceived top three mobile learning issues for both nurse supervisors and students. This research was approved by the Tasmanian Human Research Ethics Committee (H0013729).

Results

Participants ranked their own perception of the order of priority for progressing the use of mobile technology at point of care. Professionalism, accessibility (physical environment) and human factors were found to be most important. Expanding knowledge was ranked next. Accessibility (social environment), legal framework and workplace safety were deemed least important. Ranking and description of themes on each card provided to participants for the first activity are displayed in Table 9.

Table 9. Rank order of focus and description of themes

Rank order of themes	Descriptor
1 Professionalism	Governance at all levels including competency standards; codes and guidelines
2 Accessibility (1)	Environment (physical/location) including inconsistency, lack and place of access
3 Human factors	Entrustability such as confidence, ehealth literacy; learning styles; age
4 Expanding knowledge	Equipment including devices; software; data etc.
5 Accessibility (2)	Environment (social/ward culture/social referencing) including health professions; time management; presence; attitudes of workplace; safety; security; convenience/real-time
6 Legal framework/Policy/ guidelines (systems/ organisation)	Communication including documentation; error reduction and storage.
7 Workplace safety	ie including infection control; projectile (fall out of pocket); theft / loss

Participants were asked about their perceptions of enablers and barriers to deploying or implementing mobile learning in their workplace. Access to the Internet/wifi; policy related to respecting emerging care partnerships of nurses and patients; educational preparation; pace of change; compliance of students; patient-centred control of care and confidentiality were cited as barriers. Two of the barriers were also listed as enablers. These were policy change to reflect the emerging partnerships of patient-centred care and control and access to the Internet/wifi for themselves and students. A "trial period to 'run use of mobile learning' to see issues" was also articulated by some respondents.

Finally, nurse supervisors listed the top three issues they would like addressed to enable mobile learning and on the other side of the card, three issues to enable student use. The prioritised lists are shown in Table 10.

Table 10. Top three mobile learning issues to be addressed as identified by nurse supervisors

Nurse supervisor	Student nurse
Access to Internet/wifi	Access to Internet/wifi
Cost	Up to date information i.e. University and clinical information
Provision of device	Guidelines or rules regarding appropriate use

Discussion

Exploration and prioritisation of themes demonstrated the limited adoption of mobile learning, and the findings suggest professionalism, accessibility (physical) and human factors continue to dominate as the main barriers and challenges to be overcome. These themes are pertinent at an individual level, because of the impedance to nursing practice, that needs addressing at an organisation and systems level before progression to the next stage of implementation can be achieved. The findings of the ranking activity are congruent and confirm the previous research (Mather & Cummings 2016; Mather & Cummings 2015). However, successful deployment will remain unachievable until healthcare environments enable accessibility and prepare end-users to become proficient and confident in using mobile technology for learning and teaching (Bates 2002). Encouragement in developing digital literacy and modelling of digital professionalism by nurse supervisors, and engagement of change champions to model leadership (Ellaway et al. 2015; Shea & Belden 2015) will promote preparedness for moving towards successful implementation of mobile learning (Yagasaki & Komatsu 2011).

Due to current circumstances precluding access to mobile technology, the themes of legal frameworks and workplace safety were ranked as less important (Table 10). Over time as accessibility improves, these themes should become a priority (McBride, LeVasseur & Li 2015). There was also recognition that learning is important, but less so, than professionalism. If access to the Internet/wifi is unavailable at point of care, expanding knowledge in real-time is not an option and therefore, of no priority. Respondents indicated access to Internet/wifi was the most important issue to be addressed for both nurse supervisors and students. Leadership and partnerships by nurses whose professional roles are hybrid, is warranted to progress this priority. Nurse supervisors identified they need preparation in using mobile devices and updates as technology advances. Cost was also an issue, depending on whether mobile devices were 'bring your own' or provided by academic institutions or organisations (Davis, DiClemente & Prietula 2016; Poon et al. 2006). These issues as confirmed by participants will continue to hinder progression of mobile technology access until the benefits of use outweigh non-use are recognised at an organisation level (Mather & Cummings 2015).

Participants perceived that students needed access to credible contemporary information. They also indicated students required guidelines and codes of conduct for appropriate use to prevent fear of 'missing out behaviour' (Alt 2016) or distraction (McBride, LeVasseur & Li 2015). Lack of support and guidance at systems and organisation levels for professional hybrid nurses is further complicated because they are expected to model digital professionalism, which is currently unsupported by standards, or codes of conduct, nor are they assisted by organisational guidelines or policies. Pressure to progress accessibility, promote professionalism and enable appropriate and safe use of mobile technology at point of care using systems 'top-down' and individual 'bottom-up' drivers can influence organisations to change their organisational policies to enable mobile learning to become a legitimate

nursing function. However, support at an organisation level through development of standards, guidelines, codes and policies at a systems level is necessary. Combined leadership from nurses and informatics professionals is essential to effect change (Liebe, Hüsers & Hübner 2016).

Conclusion

Nurse supervisors are professional hybrids who often have both educational and leadership roles. These clinicians have an opportunity to lead driving access to mobile technology for informal learning and continuing professional development at point of care. The participants in this research identified and confirmed the barriers and challenges that persist within healthcare environments and hinder progression of preparedness of installation of this new andragogy in the workplace. The priorities identified demonstrate that digital literacy and professionalism of nurses is mandatory if deployment is to be progressed. Additionally, these clinicians will need to partner with other stakeholders to advocate for developing guidelines and policies to enable the benefits of mobile technology use within their organisations. Furthermore, at a systems level nurse leaders and change champions will need to continue lobbying professional organisations to include guidance regarding mobile technology within the standards and codes of conduct for nurses. The provision of guidance for nurses will enable a framework for installation enabling preparation for implementation of mobile learning at point of care.

6.5 Commentary on Chapter 6

The perspective of nurse supervisors from an individual, organisation and systems levels was highlighted in this chapter. It is especially apparent for nurses who are not only responsible for their own learning, but are also responsible for guiding and supporting students undertaking work integrated learning. The current lack of capacity to access or utilise mobile technology for learning and teaching at point of care is recognised by nurses as a hindrance to nursing practice. It perpetuates inefficiencies in nursing practice, as individuals need to leave the patient to access and retrieve information that impacts on nursing care. These blockages to information seeking and retrieval created at local levels within healthcare environments will continue to be perpetuated while organisation and systems level guidance is absent. Nurse supervisors confirmed there is a need for action at an organisation and systems level to enable this new andragogy to become a legitimate nursing function. Nurse supervisors have recognised and can prioritise the use of mobile learning to advance nursing practice. Inability to harness this andragogy for learning and teaching purposes or informal learning for CPD maintains the status of quo of limited acceptance of mobile learning in healthcare environments.

The research described in this chapter contributed to answering both research questions, through research objective 1, from the registered nurse supervisor perspective:

> *RQ1 RO1: To understand the nature and scope of usability of mobile learning in situ, at point of care, by registered nurse supervisors for learning and teaching, informal learning or continuing professional development in healthcare environments?*

This research also contributes to partially answering research question 2 as the lack of governance at an organisation and systems level impedes access to mobile learning at an individual level. Research objective 2 focused on the impact of lack of governance at an organisation level:

> *RQ2 RO2: To understand the organisation impact on governance of mobile learning at point of care?*

Employing an implementation framework (Fixsen et al 2005) to demonstrate the lack of acceptance of mobile learning at an organisation and systems level highlights the problem of mobile learning being a non-sanctioned learning and teaching activity in healthcare environments. This chapter provides further evidence towards answering the research questions and discuss strategies about how to respond to the problem of lack of acceptance of mobile learning in healthcare environments by nurses.

This research contributes to defining the problem within an implementation framework and in doing so aligns with a pragmatic approach of developing a response to the issue.

Chapter 7 The nexus of individuals, organisations, systems and mobile learning

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A true friend is discovered in times of uncertainty

(Marcus Tullius Cicero)

This research presents the culmination of identification of barriers, challenges, risks and benefits that contribute to whether mobile learning is enabled during work integrated learning or at the workplace. These contributing factors identified within the complex of individual, organisation and systems levels and discussed in the previous chapters (4-7) impact on the activity of mobile learning. The triad model described in this chapter depicts how these levels influence the factors within the triad (Figure 6).

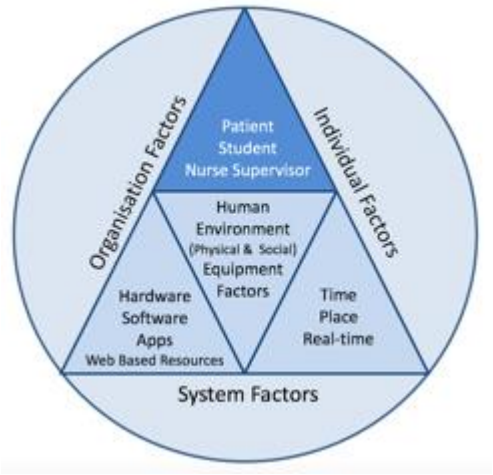

Figure 6. The triad model

At the centre of the triad are the factors of human, environment and equipment. Each apex of the triad represents one of the factors, which have a tendency to be more influenced at individual, organisation or systems levels as shown by the model. The model depicts the physical environment at the base of the triad and includes equipment factors such as access to mobile or portable devices, use of apps, or access to data. This factor is influenced more at organisation and systems levels. The social environment relates to the ephemeral qualities of time, place and real-time and are more influenced at individual and systems levels. Human factors of patient, student and nurse supervisor are primarily influenced at individual and organisation levels. One of these three dimensions is placed at the peak of the triad depending on which has the locus of influence. This chapter focuses on the human factors of patient, student and nurse supervisor. The interactions between these *actors* influences, and is influenced by the individual, organisation and systems levels that are also supported by the physical and social environment and equipment factors within the triad that impedes or promotes the activity of mobile learning. The use case scenario described in this publication builds on the human factors of patient, student and nurse supervisor placed at the peak of the triad. Mobile learning has the ability to empower learners, whether they are patients, students or nurse supervisors. Moreover, it reveals the function of mobile learning as legitimate learning and teaching strategy to transform the nurse-patient relationship at point of care. This chapter is divided into four sections:

- Section 7.1 provides an introduction to publication 10; which describes a triad model of patient, nursing student and nurse supervisor using mobile learning to transform learning at point of care;
- Section 7.2 presents publication - Empowering learners: Using a triad model to promote eHealth literacy and transform learning at point of care;
- Section 7.3 provides commentary on Chapter 7 and its contribution to answering research question 1, objectives 1 and 2; and
- Section 7.4 provides an assessment and reflection on answering the research questions in Phase 1.

7.1 Introduction to publication 10

This paper describes how the triad model encapsulates the factors that impact mobile learning at point of care. It displays how mobile learning can be used to positively transform the nurse-patient relationship within healthcare environments. The use case scenario shows the implementation of this andragogy as a legitimate nursing function has the capacity to improve knowledge and skills acquisition; enable communication; engender healthcare delivery; and promote positive health outcomes if used effectively and efficiently by nurses. This learning and teaching strategy can be used to assist with the development of digital professionalism by students as part of professional identity formation. Students can be guided when to use this learning and teaching strategy with patients. Nurse supervisors can model appropriate behaviour to ensure students grasp how to safely and effectively use this strategy at point of care. Additionally, mobile learning can facilitate the nurse-patient relationship and promote ehealth literacy of end-users. Educational preparation of nurse supervisors and students to competently use mobile learning, discern credible information and partner with patients to promote care provision, can facilitate deployment of mobile learning at point of care. Patient-centred care supports the creation of student-centred learning where a partnership between the nurse and patient can be realised, if it is can be conducted in real-time at point of care.

Safe and appropriate use of mobile technology is required to become inherent in healthcare environments. It is essential that end-users understand the legal and ethical considerations of using mobile learning *in situ*. The modelling of digital professionalism and promotion of a workplace culture, where mobile learning is accepted as a legitimate nursing function, needs to be accomplished. There is now an imperative to develop robust policy and guidelines to support the deployment of mobile learning in healthcare settings, to ensure patients, students and nurse supervisors have the opportunity, to transform the nurse-patient relationship and improve health outcomes.

7.2 Publication 10 - Empowering learners: Using a triad model to promote ehealth literacy and transform learning at point of care

Mather, C and Cummings, E, "Empowering learners: Using a triad model to promote eHealth literacy and transform learning at point of care", *Knowledge Management & E-Learning: An International Journal*, **7** (4) pp. 629–645. ISSN 2073-7904 (2015).

Abstract

The implementation of health technology and informatics into healthcare environments has enabled new opportunities for developing patient-centred approaches to care. The emergence of mobile learning as a new pedagogy for learning and teaching of undergraduate nurses and for continuing professional development can be used to strengthen the nurse-patient relationship. Incorporation of ehealth literacy education and health promotion by nurses, using digital technology tools and

resources, will assist with empowering patients to access information and options for managing their own health. These developments provide opportunities for embracing a learning triad with patient, student, and nurse supervisor using digital technology at point of care. This triad should be embedded as a partnership to enable promotion of ehealth literacy in situ. A use case scenario is provided to demonstrate the potential of advancing ehealth literacy of patients in healthcare environments using the triad model. Collaboration and sharing information using this new method of learning has the potential to promote ehealth literacy and transform the nurse-patient relationship.

Key words: ehealth literacy; mobile learning; patient-centred care; triad model; nurse-patient relationship.

Introduction

The emergence of digital technologies has provided unparalleled opportunities for empowering mobile learners to promote both health and ehealth literacy *in situ* at point of care. Importantly, as nurses are well-placed to be frontline in progressing ehealth literacy of patients, use of point of care digital technologies by nurses for educational purposes must be embraced as a legitimate nursing function. Collaboration and sharing of information using mobile learning tools and resources has the potential to transform the nurse-patient relationship. Incorporating ehealth literacy education and health promotion by nurses and nursing students will assist in empowering patients to access information and opportunities for managing their own health and well-being. The increase in prevalence of chronic diseases provides impetus to improve health outcomes and reduce costs (Kanj & Mitic 2009). Improving health literacy and ehealth literacy has the potential to ameliorate poor health outcomes and promote patient-centred care (Kanj & Mitic 2009) by enabling patients to learn about, and manage their own care.

Nurses are central to care service provision and are well-positioned to develop rapport, create trust, learn about, and from their patients, whilst enabling opportunities to assist with assessing and the development of ehealth literacy of their clients. This relationship can be augmented using a triad model (Figure 7) comprised of patient or client (patient), student, and nurse supervisor that is based on the mutuality of intent to communicate, create trust and commitment to improve health and well-being (Zeffane, Tipu & Ryan 2011).

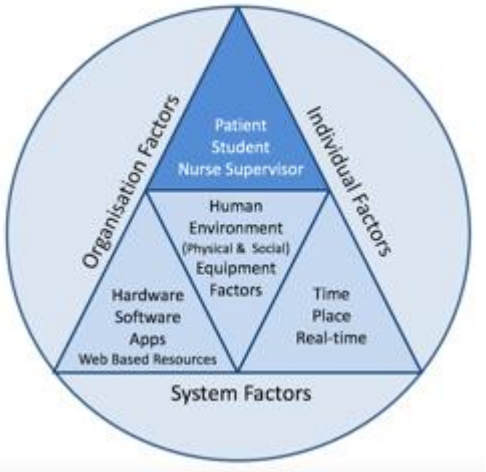

Figure 7. The triad model

The triad model operates within the complex of system, organisation and individual factors, and optimal effect is achieved when supported by the human, environment (physical and social) and equipment factors. The evolution or maturation of the patient, student, and nurse supervisor relationship has the potential to increase understanding and learning for the patient and student (Manninen et al. 2014). Nurse supervisors, who are both educators and clinicians, guide and support the learning of undergraduate students while undertaking work integrated learning. Nurse supervisors

are also responsible for ensuring that patients receive appropriate information while interacting with students. It is becoming increasingly important to harness the learning triad (Plack 2008), to improve health outcomes of patients, enable self-management, and promote patient-centred care. The deployment of mobile learning into healthcare environments has been slow (Mather & Cummings 2015) resulting in arrested opportunities for promoting ehealth literacy of patients by nurses and their students at point of care. Additionally, a range of barriers, challenges, risks and benefits of using health technology and informatics in healthcare settings have been identified. These include human, equipment and environment factors at individual, organisation and systems levels that have also hindered the advancement of promoting ehealth literacy by end-users (Kemppainen, Tossavainen & Turunen 2013; Martyn et al. 2014; Mather, Marlow & Cummings 2013; Moyer 2013; Prgomet, Georgiou & Westbrook 2009).

This paper describes the complex matrix of knowledge, skills, attitudes and behaviour employed by the triad model of patient, student, and nurse supervisor (human context) at point of care to enable a supportive (physical and social) environment promoting ehealth literacy assessment and development.

Systems level considerations for understanding ehealth literacy in Australia

There has been considerable debate defining and conceptualising literacy (UNESCO 2006). It can be viewed as an autonomous set of skills; applied, practised and situated; be a learning process; and be text (UNESCO 2006). During the last 60 years there has been international policy development on literacy that has influenced current understandings of the term. Previously, functional literacy has dominated the field because criteria for demonstrating technical skills are easier to identify than conceptual literacies (Jochelson 2009). More recently, literacy has evolved to become learner-centred, with a focus on collaboration and social practices to enable learners to engage and build their learning through interaction in their socio-cultural settings (UNESCO 2006). This development has led to an understanding that literacy is no longer understood "as an individual transformation, but as a contextual and societal one" (UNESCO, 2006: p. 159). Using the triad model this paper builds on current understandings of literacy and harnesses the concept of critical literacy and empowerment as it is central to this learning process through exploring, investigating, interpreting, reflecting, theorising engagement with the context (UNESCO 2006).

Health literacy

Nutbeam (2008) discussed the development of the concept of health literacy from two differing perspectives. He framed the evolution of the concept from the clinical domain as 'risk' because it was recognised there was a relationship between poor literacy skills and health status that is apparent within the clinical environment. There has been a shift in clinical practice and organisation of care to promote health literacy. It focuses on the development of skills and capacities of people to have more control over their health by empowering and engaging them in decision-making about their health and communities to develop confidence (self-efficacy) to act on their knowledge. Additionally, the triad model supports and empowers learners to develop skills in discerning credible information and to access tenable resources that can be used to promote health and well-being.

Ehealth literacy

In healthcare settings, the computer literacy of health professionals, especially nurses, has been discussed by authors since the 1970s (Armstrong 1986; Saba 2001; Schoville & Titler 2015; Silva 1973). Silva (1973) described her view of nursing in the computer age and was aware of the educational ramifications of introducing computers and computing into the curriculum for educational and clinical purposes. There was early recognition that technology can assist with transformation of healthcare environments. The role of ehealth literacy is pervasive within healthcare settings and evidence-based practice relies on this concept (Forster 2015). It is essential the health profession workforce can accommodate implementation of emerging technologies within healthcare settings to promote cost-effective, high quality and safe care (Schoville & Titler 2015). eHealth literate nurses are key to assisting with guiding health technology implementation and contribute to improve

healthcare and health outcomes (Schoville & Titler 2015). eHealth literacy is a core concept required for improving healthcare delivery and for communication with patients to promote health.

Human context considerations for understanding health literacy in healthcare environments

Health professions

Health promotion at an individual level and as a public health approach by health professionals with patients is well documented (Burgess, Bruns & Hjorth 2013; Kemppainen, Tossavainen & Turunen 2013; Nutbeam 2000). Patient education, including health promotion, is a fundamental competency undertaken by health professionals, especially nurses, in a range of healthcare environments (Irvine 2005). Emerging technology has enabled opportunities that were previously unavailable (Estabrooks, Wallin & Milner 2003; Mather & Cummings 2014) and changed expectations of healthcare interactions by patients and health professionals (Illiger et al. 2014; Manninen et al. 2014). Health literacy (Kanj & Mitic 2009; Nutbeam 2008), health technology, and health informatics have also been found to be vital for promoting health and education of patients (Irvine 2005).

Househ (2013) explored the impacts of social media on healthcare organisations, clinicians and patients. The author found that health professionals engage in social media in a variety of ways such as providing information about health topics relating to education, health promotion using a variety of digital platforms. They concluded all stakeholders have a responsibility to ensure that health information that is transmitted through digital platforms is reliable, credible and trustworthy (Househ 2013).

Face-to-face interaction between health professionals, community services personnel, and patients, adds an extra layer of complexity to provision of care. Currently a minimum standard of literacy and understanding of health terminology is required to ensure the consistent, high quality and safe service to patients is delivered (Australian Commission on Safety and Quality in Health Care 2014). Additionally, people entering the healthcare sector due to their circumstances may be vulnerable, ill or confused, requiring sensitive and caring responses to meet their needs. Adequate health literacy levels of health professionals is necessary provide high quality care to maximise patient outcomes. Assessment and enabling improvement of health literacy knowledge and skills in a population requires more than the transmission of health information. It requires support to enable promotion of empowerment to facilitate individuals and communities to develop confidence (self-efficacy) and act on their knowledge.

Nurses and nurse supervisors

Deployment of health information technology in healthcare has been slow. A number of human factors which impact upon the uptake of digital technologies and deployment of mobile learning have been identified; these include work demands, access to computers, educational support and training as well as age and technical expertise (Estabrooks, Wallin & Milner 2003; Hegney et al. 2007; Mather, Marlow & Cummings 2013). Recent studies of perceptions of nurses using mobile devices for informal learning or continuing professional development indicated that attitudes have become more positive (Fahlman 2013). Leadership by health professionals, especially nurse supervisors, enabling the use of informal and mobile learning at point of care, has the capacity to transform the nurse-patient relationship and promote health and ehealth literacy at the right time and place in real-time for patients.

An integrative review by Kemppainen and colleagues (2013) found that nurses were patient-focused health promoters who work from an holistic or patient-oriented theoretical perspective (Kemppainen, Tossavainen & Turunen 2013). Nurses use empowerment strategies at an individual level to achieve health promotion of their patients. Knowledge, skills, attitudes, and personal characteristics of nurses were found to impact on their ability to promote healthy behaviours. Communication, collaboration, and advocacy were vital for supporting patients in decision-making. Skill-related competence

included time management, searching for information; interpretation and gathering data from a range of sources (Kemppainen, Tossavainen & Turunen 2013). The nursing workforce can accommodate the implementation of new technologies providing appropriate support and resources are encouraged (Schoville & Titler 2015).

Patients

With the increasing incidence of people living with complex chronic conditions or disability, healthcare professionals and patients are looking to technology to assist in developing self-management skills. People with chronic conditions are regularly expected to monitor aspects of their health and to use the data to make decisions about their management (Cummings & Turner 2007). Understanding the individual patient's capacity and ability to interact with the technologies and how they relate to self-management is extremely challenging (Cummings & Turner 2010). There appears to be a correlation between health literacy and self-management skills (Cummings, Ellis & Turner 2017; Jordan et al. 2008; Pearce-Brown et al. 2009). The ability to seek, access and use information, and resources on the Internet can empower patients to learn about their conditions and assist in making healthcare decisions. However, it must be recognised that accessing health-related information and use of social media to discuss healthcare does not imply health or ehealth literacy (Jordan, Buchbinder & Osborne 2010). It is recognised the people most likely to have chronic conditions tend to be those with lower health literacy, and are less likely to be able to self-manage their conditions (Hawkins, Kantayya & Sharkey-Asner 2010; Pearce-Brown et al. 2009).

Schnall and colleagues (2015) investigated perceptions of trust, risk, ease of use and usefulness of mobile health technology use (Schnall et al. 2015). Many patients are concerned about security, privacy and storage of information, so whilst they may be keen to use software or apps that that are intuitive to use they do not necessarily want to rely on, or trust, Internet connectivity (Cummings, Borycki & Roehrer 2013). Researchers and healthcare providers are now suggesting a reasonable degree of scepticism is required in relation to the quality and effectiveness of medical and healthcare apps. It has been identified for patients to successfully use these technologies they require a degree of both health and ehealth literacy (Cummings, Borycki & Roehrer 2013; Doughty 2011).

Digital technology considerations for promoting ehealth literacy in healthcare environments

Ubiquitous computing

The term ubiquitous or pervasive computing is used to describe the integration of computers into everyday activities and life (Weiser 1991). Whilst the shift to ubiquitous computing and mobile learning for health professionals, especially nurses and patients within healthcare environments, has been limited due to barriers, challenges and risks that have been well documented (Button, Harrington & Belan 2014; Martyn et al. 2014; Moyer 2013; Strandell-Laine et al. 2015). Benefits are also being realised. Falling price and increase of choice available of mobile devices to consumers has contributed to the proliferation of ownership to the point where, for many people, mobile devices have acquired the status of basic need rather than luxury gadget (Nair & Bhaskaran 2015). Competing service providers also offer cheaper data access plans that facilitate encouragement of using mobile devices. The ubiquity of access to mobile technology and health information enables participatory care and increases the onus and expectation that nurse supervisors have the capability to guide students and patients in appropriate access to information or resources (Nair & Bhaskaran 2015). Having the ability to learn at the right time and place; in real-time; interact with peers, teachers and experts; and receive information immediately in the learning environment is now possible (Yahya, Ahmad & Jalil 2010). Within healthcare, often the expert is the patient and access to information or resources via a wireless network, offers opportunity to augment formal learning.

Mobile learning

The evolution of mobile learning has progressed from focusing on the nature of mobile devices to mobility of the technology and now the emphasis is the mobility of the learner and the learning process (Traxler 2007). Sharples and colleagues (2005) focused on the mobility of the learner and proposed a theory of mobile learning that demonstrated the convergence between learning and technology (Sharples, Taylor & Vavoula 2005, 2007). Mobile learning is a constructivist approach that is characterised by information transfer which is internalised to create and share meaning. It can be argued that by using mobile and context aware technology, learning can occur through informal knowledge sharing as well as through institutional education. Mobile learning enables opportunities to augment formal learning, promote dialogue, and interactions that were previously unavailable (Mather, Marlow & Cummings 2013). Human, equipment, and environment issues including organisational barriers continue to impede implementation of this pedagogical opportunity to promote ehealth literacy *in situ* in healthcare environments (Mather & Cummings 2015).

The nexus between digital technology and learning and teaching for promoting ehealth literacy in Australian healthcare environments

Health promotion and patient education

Patient-centred care provides opportunities for individualistic health promotion (Casey 2007; Nutbeam 2000) and when used in the clinical environment by nurses can promote the nurse-patient relationship (Casey 2007). The ability to provide health education to patients is valued as an integral competency of nurses (Australian Nursing and Midwifery Council 2006) and studies have found that factors influencing patient participation in health promotion depends on the patient and healthcare environment. Where there is a lack of empowerment, time or heavy workload or where routine dominates, there is also a related negative impact on health promotion by nurses (Petit dit Dariel, Wharrad & Windle 2013). The ability to develop relationships with patients is more likely when there are resources, training, access to information available and an accepting culture of learning in the workplace (Casey 2007).

Learning and teaching

Changes in nursing curricula to include health technology and nursing informatics can guide and promote the development of the use of digital technology by nurses for patient care. This process should include promotion of health education of patients and enable opportunities to assess and promote ehealth literacy. The Australian Commission on Safety and Quality in Health Care national statement (2014) on health literacy is viewed as Australia's national approach to addressing health literacy (Australian Commission on Safety and Quality in Health Care 2014). This statement acknowledged health literacy's importance for enabling effective partnerships within healthcare, including the patient. It outlined the challenge for safety and quality when only about 40% of adults have the level of individual health literacy needed to meet the complex demands of everyday life. Low health literacy contributes to higher rates of adverse outcomes and lower uptake of health protection and promotion (Australian Commission on Safety and Quality in Health Care 2014). Additionally, a report advancing ehealth education for the clinical health professions by Gray and Colleagues (2014) acknowledged a lack of systematic approach to designing, teaching, assessing or accrediting ehealth curriculums that needed to be addressed. It provided important information for curriculum design and renewal in ehealth education for undergraduate and postgraduate programs in Australia (Gray et al. 2014).

The introduction of technology into the nursing curriculum is the most significant change since the move to the tertiary education sector (Button, Harrington & Belan 2014). However, currently, few nursing courses overtly describe the health informatics competency level expected by their graduates, nor have they developed clear strategies for integrating competencies into their curricula (Borycki et al. 2013). Student nurses are graduating without sufficient knowledge of nursing informatics to be able to work effectively and efficiently. Additionally, there has been a lack of investment in

developing tools representative of real-world settings that would assist with students developing the underlying theories and principles requisite for being competent at graduation. Embedding informatics into the undergraduate nursing curriculum will be a useful advancement for ensuring nursing students attain competency in health informatics and an understanding of ehealth literacy by graduation that is sufficient to engage patients in their own care (Borycki et al. 2013). Additionally, deployment of this new educational paradigm has partly been made possible by the affordances of digital media (Norén Creutz & Wiklund 2014) and upskilling of students and educators needs include understanding when it is appropriate to use digital technology within healthcare settings (McBride, LeVasseur & Li 2015).

The nexus of digital technology and opportunity for learning and teaching to promote ehealth literacy using the triad model

Although the use of the Internet is widespread with 16 million Australians estimated to be online and almost 80% of them seeking health information using this medium, studies in other countries have found that readability of online health information is above the average reading ability of adults (Cheng & Dunn 2015). In Australia online health information has been found to be written two to four grades higher than the benchmark of grade 8 recommended (Cheng & Dunn 2015). This finding has serious implications for peoples' understanding and self-management of health conditions. Additionally, reading habits for using the web are different from reading printed material; web users tend to browse web pages before deciding to read on, making rapid decisions about whether the information is useful or difficult to understand and may abandon web pages that are not appealing within the first few paragraphs.

Developing the ability to search the Internet and understand the credibility of information is an element of health and ehealth literacy that should not be underestimated (Jochelson 2009). Nurses use intuition, quasi-rational cognition and analysis to judge the reliability of information related to practice on the Internet (Cader, Campbell & Watson 2009). Importantly, nurses need to be afforded time to access the Internet while at work to enable them to gain confidence and the opportunity to access evidence-based information (Cader, Campbell & Watson 2009).

Evidence suggests many students lack important competencies essential for finding and evaluating health information. Ivanitskaya and colleagues (2012) identified students' demonstrated difficulty discriminating between primary and secondary sources of information or to discern credible sites by checking trustworthy features. Students' levels of health and ehealth literacy can be improved during professional experience by nurse supervisors prepared to give timely feedback. It is important the nurse supervisors can provide students with suggestions about strategies to improve their ehealth literacy within the practice setting. They may also be required to ensure students know how to access University resources, including library and student services. Students are the next generation of health care providers and it is essential they are adequately prepared to engage with patients, assess and assist with ehealth literacy development at point of care.

As previously noted, patients are increasingly able to access vast amounts of health-related information. In most developed countries access to technology has become ubiquitous, but assuming that accessing information equates to understanding is problematic. There has been little direct engagement with patients in assessing and improving their health and ehealth literacy, despite the push towards home self-monitoring and self-management (Cummings, Ellis & Turner 2017) Healthcare practitioners can assist their patients improve their health and ehealth literacy through demonstrating their use when explaining conditions and treatments (Cummings, Ellis & Turner 2017). By aligning health and ehealth literacy concepts there is now an opportunity to strengthen the triad model of patient, student and nurse supervisor for mutual benefit of learning at the right time and place, at point of care.

In common with most developed countries, in response to the challenges of delivering quality, efficient and effective healthcare the Australian government has committed to introducing the Personally Controlled Electronic Health Record. This health record provides shared access to summary data for both patients and healthcare providers based on shared responsibilities (Almond,

Cummings & Turner 2013). Patients are provided with their own section in the eHealth record to capture personal information and make notes about their healthcare that can be shared with their healthcare practitioners. This data can be used for patients with chronic conditions to engage in self-monitoring and recording symptoms, as well as goal setting and recording self-management information. However, as with the use of other technologies patients require education and support to maximise the benefits of these advances.

Use case scenario

A use case scenario has been developed to demonstrate how the learning triad can be used and each member engaged in complementary skills development and education to enhance health and ehealth literacy. The use case scenario shows a learning triad situation where a student nurse and patient recently diagnosed with type 2 diabetes undertake promotion of health and health literacy. The actors are engaged in mutual learning under the guidance of the nurse supervisor. This scenario occurs in the hospital setting where the student nurse uses mobile learning to assist the patient in understanding management of their diabetes. This interaction focuses on enabling the patient to self-manage their condition and access further information when they are at home.

Use Case description

The recently diagnosed type 2 diabetic patient would like to know about what food and beverages they can consume when they return home. The student uses a mobile tablet device to show the patient how to browse for a credible site about this topic. The patient knows how to use a computer for social media, email and browsing using a search engine, but is unsure about checking credibility of the information. The nurse supervisor is present.

Actors

- Student
- Patient
- Nurse supervisor
- Internet / access to web-based resources.

Trigger

The patient indicates they want to understand more about the food and beverages they can consume on return home.

Preconditions

The student has access to a mobile device and wireless Internet at point of care.

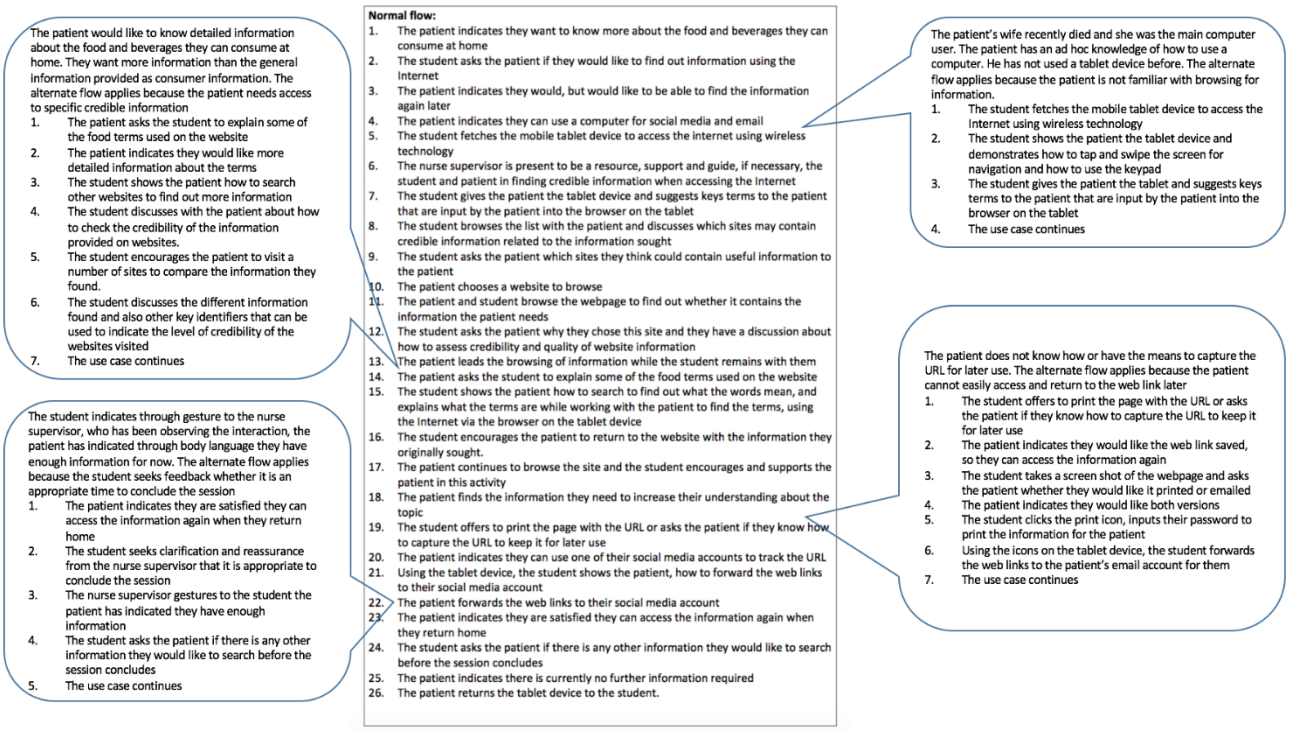

Figure 8. Use Case Scenario

Post-conditions

The patient will know where to find credible information on the internet about what food and beverages they can consume at home

The student will have enabled ehealth literacy development of the patient by sharing how to discern credible information and showing them how to browse for credible websites on this topic

The student will have gained an understanding about the lived experience of the patient and their need to know about management of their illness

The patient and student will have shared understanding about what food and beverages can be consumed by the patient on return home.

Exceptions

This use case scenario relies on the patient having foundation level understanding of information communication technology; willingness to use the Internet to seek information; willingness to be assisted by a student; and interest in learning how to discern credible information and resources.

This use case scenario assumes the student has sufficient health and ehealth literacy proficiency to be able to communicate with the patient and assist them to find out health information. The student can enable the patient to learn how to seek information, using information communication technology.

Discussion

As demonstrated by the use case scenario above, the emergence of digital technology in healthcare has enabled patient-centred care to be further refined to embrace the opportunity to assist knowledge development of, and with the patient relevant to their health needs, and assist them to understand how to find credible information. This transformation is enabled when health professionals understand the power of mobile learning as a resource that can be used to develop this learning partnership. Literature indicates that students increase their confidence and competence if they are afforded high quality clinical placements. When students develop a respectful rapport with their nurse supervisor the most effective learning occurs (Cooper, Courtney-Pratt & Fitzgerald 2015; Kim, et al. 2014). A

student-centred approach is vital for facilitating student learning during work integrated learning (Newton et al. 2012). The learning triad model (Figure 8) can be used to promote and integrate ehealth literacy into healthcare environments; when working with patients to improve health and well-being, and enabling patients to manage their own care.

In Australian healthcare workplaces, most nurse supervisors have access to web-based materials via mobile or desk-top devices. It is important that these clinicians are confident in their ability to judge the quality and reliability of clinical information used in learning and teaching (Cader, Campbell & Watson 2009). Furthermore, nurse supervisors are role models for students who may not have developed competence in making decisions about the quality or reliability of information they find on the Internet. It is important that nurse supervisors have the knowledge and skills to support and guide their students in all aspects of care and so competent use of nursing informatics is part of that process. Nurse supervisors need to be able to demonstrate competence with the retrieval, manipulation and recording of patient data, and to research and critique evidence based clinical information. Moreover, they need to be able to support patients in locating or accessing salient health education information (Gray et al. 2014). These leaders in health care are advocates for improving ehealth literacy of their patients regarding their care. Nurse supervisors are educators of much more than students in nursing. They are role models for empowering people to participate in their own care (Casey 2007).

The burgeoning use of digital platforms also adds another dimension to healthcare that nurse supervisors cannot ignore. Students now have access to mobile health technologies such as laptops, tablets and smart phones. Access to mobile devices increases the ability to retrieve or verify information quickly. Nurse supervisors need to guide their students in appropriate and timely use these devices enable. Access to digital platforms can be used to strengthen ehealth literacy in some target groups. The role of the nurse supervisor is to ensure that students understand the opportunities that are available to patients to engage in personalised health care by using mobile technology and accessing information on the Internet. However, it is important students learn to discern and recommend appropriate and credible sites (Rowley, Johnson & Sbaffi 2015). It is imperative that students also understand the legal and ethical implications of using or recommending specific sites to patients. They also need to be aware of the policies and guidelines of the healthcare setting regarding their use of digital technology (Mather & Cummings 2015).

Nurse supervisors need to navigate the nexus of their student's and the patients understanding about ehealth literacy. Using the learning triad model, nurse supervisors need to be able to guide students in learning about how to communicate health information to patients in a way the patient can comprehend. Using the lived experience of the patient narrative can enable active learning about the patient, their illnesses, conditions and care, if a partnership of mutual reciprocity is enabled. The partnership of patient, student and nurse supervisor enables the potential for significant learning and legitimate peripheral participation of students (Fink 2003; Lave 1991). Students and patients have the opportunity to create meaning from their interactions. Microlearning by students using right time and place in real-time can be used as an adjunct to construct knowledge or reinforce concepts (Gassler, Hug & Glahn 2004). Using mobile learning *in situ* at point of care to gather information as part of patient care is an inclusive patient-centred approach. Development and integration of this new pedagogy into healthcare environments has the capacity to transform the nurse-patient relationship. The interactivity and collaboration of the triad model of patient, student and nurse supervisor has the potential to promote health and ehealth literacy in ways that were previously unavailable.

There is a need to add understanding about ehealth literacy concepts into the undergraduate curriculum and then through diffusion of innovation for use at point of care for health promotion, information sharing and development of partnerships with patients (Hegney et al. 2007). It is a professionalism and participation issue of stakeholders and a way of legitimising mobile learning as part of nursing care. The increase in patient participation as a right and expectation means that nursing needs to move with the trend. Being able to demonstrate appropriate use by engaging patients will assist in this process (Cummings, Borycki & Roehrer 2013).

Whilst nurse supervisors need to be aware of digital reading habits, students need to be aware that ehealth literacy of their patients may vary and accessing credible information may be difficult for

some of them. Student nurses need to be aware of their own level of ehealth literacy and Internet proficiency. They need to learn about credible sources prior to entering the clinical practice environment where errors of judgement may have implications for patient health outcomes (Rowley, Johnson & Sbaffi 2015). Nurse supervisors can guide students and patients in accessing and comprehending health information and enabling adjunct methods such as video or print material to augment learning. Understanding different learning styles can also assist students and patients to access information. Nurse supervisors play a vital role in enabling students and their patients to access health information and improve their ehealth literacy (Cheng & Dunn 2015).

The future

There will be continued growth of social media and healthcare applications to promote health, prevent disease, and manage chronic conditions. The use of telehealth and other media for interaction with healthcare providers in real-time will also continue to increase. Opportunities to access contemporary, evidence-based best practice, appropriate patient information, *in situ* at point of care, in real-time could outweigh resistance and negative perceptions. Additionally, through improvements in technology, access at point of care to diagnostic and therapeutic resources; clinical and education information will become seamless. Over time there will be greater acceptance of mobile learning within healthcare organisations that can promote a learning culture and support the triad model of patient, student and nurse supervisor learning at the right time and place in real-time at point of care.

The development of best practice guidelines and policy to support the deployment of mobile learning and emergence of ubiquitous computing within healthcare environments at point of care are essential. The promotion of connected health using the triad model of patient, student and nurse supervisor can be employed to advance the development of ehealth literacy of patients. Evaluation of ehealth literacy development using the triad model to promote health and well-being at point of care is warranted.

Conclusions

Emergence of new technology creates pressure for change, the opportunity to improve ehealth literacy is now. Never before has there been an opportunity to access and harness learning in real-time at point of care. The triad model provides guidance from supervisors to students, and with patients. There is opportunity to hone communication skills, develop rapport and promote a mutually beneficial therapeutic relationship. Using mobile technology and mobile learning is essential to ensure patients receive the opportunity to maintain and develop their ehealth literacy. Patients can become empowered to advance their understanding about health, their treatment and assist with improving self-care and health outcomes. Cost containment through time-saving, error reduction and real-time access to information at point of care can advance ehealth literacy and transform the nurse-patient relationship. Future-proofing health of patients by improving ehealth literacy *in situ* is an innovation that can no longer be ignored.

7.3 Commentary on Chapter 7

The research objectives of this chapter reflect a response to the issue by presenting a triad model and use case scenario to demonstrate how mobile learning can be used for learning and teaching, informal learning or CPD within healthcare environments as a legitimate nursing function. Both objectives of research question 1 were used to guide the development of the triad model of patient, student and nurse supervisor from a point of care perspective:

> *RQ1 RO1: To understand the nature and scope of usability of mobile learning in situ, at point of care, by registered nurse supervisors for learning and teaching, informal learning or continuing professional development in healthcare environments?*

RQ1 RO2: To understand the nature and scope of usability of mobile learning in situ, at point of care, by undergraduate nurses, for learning and teaching, informal learning or continuing professional development in healthcare environments?

This research contributed to answering research question 1 by demonstrating how mobile learning can be installed as a legitimate nursing function. The use case scenario shows how mobile learning can assist with learning and teaching of students and include patients in their own care. This change in nursing practice can support participatory medicine and has the potential to improve patient care. Nurse supervisors can guide and support students in developing rapport with patients or strengthening their own relationships with learners using mobile technology for learning. The chapter provides an insight into how limited acceptance of mobile learning in healthcare settings has impeded the growth of the nurse-patient relationship, as this triad model using mobile learning is not currently implemented in Australian healthcare environments. The lack of governance at a systems and organisation level has impeded the installation of this andragogy for informal learning and teaching of undergraduate nurses and patients.

This chapter describes mobile learning at point of care within the pragmatic lens of enquiry for responding to a problem. The individual level within systems theory is the focus and describes how nurses can enable mobile learning at point of care. This chapter is a synthesis of information from Phase 1 of this research.

7.4 Assessment and reflection on answering the research questions in Phase 1

The pragmatic lens of enquiry supported recognition of the problem from the perspective of nurse supervisors, undergraduate nurses and healthcare environments. Phase 1 of this research focused on the nature and scope of usability of mobile learning from an individual, organisations and systems level. Investigation of the nexus of nursing, mobile technology and mobile learning were guided by the research questions and objectives as outlined in Table 11. This Table provides a summary of research questions and objectives answered in Phase 1 of the study, presented in Chapters 3 to 7 of this dissertation.

Table 11. Summary of research questions and objectives answered in Phase 1 of study

Chapter Number	Publication Number	Research question	Research objective
Phase 1			
3	2	1	1
3	3	1	1
4	4	1	2
4	5	1	2
5	6	1 2	1 2
5	7	1 2	2 2
6	8	1	1
6	9	2	2
7	10	1	1 & 2

The research demonstrates the limited acceptance of mobile learning using mobile or portable devices from the perspectives of the actors, that is, the nurse supervisors and undergraduate nurses and how this impacts recipients of care, the patients. Access and use of mobile learning at point of care when it is appropriate and safe to do so allows development of collaborative partnerships at the bedside.

Actors being present at point of care is an inclusive activity, which can be harnessed for the benefit of student learning and for patients being able to make decisions about their own care.

Modelling of digital professionalism by nurse supervisors will assist with positive professional identity formation and enculturation appropriate and safe use of mobile or portable devices by nursing students. The legitimate use of mobile or portable devices at point of care will promote ubiquitous computing. Phase 1 shows the challenges and risks will need to be evaluated however, legitimisation of mobile learning at point of care may also assist in reducing inappropriate behaviour as it will no longer be a dissuaded activity. As such, inappropriate use of mobile or portable devices will continue to be regulated through professional Boards or through civil legal action. There will also be an expectation of responsible use of mobile or portable devices that is currently covert and unmonitored (Mackay, Anderson & Harding 2017). This research found legitimisation has the potential to minimise inappropriate behaviour, close the theory–practice gap and enhance nurses' performance while at the workplace.

Accessing learning and teaching resources at point of care provides opportunities for undergraduate nurses to grasp concepts at point of care rather than leaving the bedside to find information that enhances their understanding and contributes to their learning. Being able to seek and retrieve information when they need it can reinforce concepts and enable retention of information that was previously unachievable. This method of learning may be a useful adjunct to traditional learning as it supports visual and kinaesthetic learning styles.

Retrieving information in real-time adds a dimension to learning that was previously unavailable. The capacity of registered nurse supervisors to model informal learning and include others in this sharing changes how healthcare can be decided and delivered. Staying at the bedside rather than leaving the patient to seek and retrieve information means nurses have the opportunity to spend more time with patients and promote more wholistic care provision. Having access to information in real-time also reduces the potential for error as clarifying information can aid in decision-making that may prevent adverse health outcomes. Development of rapport and reduction of the appearance of the 'busy nurse' may also enhance the nurse-patient relationship as nurses can discuss or show information to patients.

Phase 1 of the research explored the use of digital technologies as a platform and the development of mobile learning as a strategy for informal learning and CPD of nurses. It investigated the preparedness of nurse supervisors to develop and engage in using digital technology. It also reports the digital literacy of nurse supervisors and their capacity to support undergraduate nurses during work integrated learning. Identification of differences in behaviour of undergraduate nurses in accessing information, using a portable or mobile device, when undertaking work integrated learning compared to other non-work situations and what they would prefer to do was a focus of this research. Investigation of mobile learning opportunities for informal learning and CPD by nurse supervisors for their own professional practice and in their role of facilitating student nurses' learning in practice was conducted. The pragmatic approach allows for developing a response, evaluation and for resolution to the problem. The complex matrix of knowledge, skills, attitudes and behaviour enabled by using the triad model of patient, student, and nurse supervisor to promote learning at point of care was presented through a use case scenario, to show how mobile learning could be used in healthcare environments. This phase demonstrates by using an example, a response to the limited acceptance of mobile learning in healthcare environments. Evaluation of the utility of this model as a potential solution warrants further research. However, this research also found the continuance of lack of governance will maintain the *status quo* of inability legitimately undertake mobile learning at point of care in Australian healthcare environments.

Chapter 8 Governance in nursing

Primum non nocere

First, do no harm

("H.H.")

This chapter introduces Phase 2 of the research, which focuses on understanding the impact of governance structures on mobile learning at point of care. This research builds on the findings of Phase 1 that revealed the complex of factors that contribute to the limited acceptance of mobile learning using mobile or portable devices at point of care. To enable mobile learning to advance nursing practice at an individual level will require alteration in the current standards and codes of professional conduct of nurses at a systems level. These changes will provide guidance at an organisation level that will enable nurse leaders who have become professional hybrids. Due to their roles and functions within organisations these nurses have extended boundaries of responsibility that includes the profession of nursing and education or management. These nurses are leaders within the profession and provide a conduit into other areas, including governance within healthcare environments. Nurse leaders will need to advocate and promote the use of mobile learning for learning and teaching, informal learning and CPD at point of care. Additionally, these nurses will need to gain leverage by ensuring they are included in decision-making regarding policy and guideline development within organisations. By provision of high-level guidance at systems level, will facilitate change within organisations to meet at an individual level, the learning and teaching needs of nurses. This chapter is divided into three sections:

- Section 8.1 provides an introduction to publication 11, which analyses the current governance arrangements in nursing in Australia;
- Section 8.2; presents publication - Governing mobile technology use for continuing professional development in the Australian nursing profession; and
- Section 8.3 provides commentary on Chapter 8 and its contribution to answering research question 2, research objective 1.

8.1 Introduction to publication 11

This publication analyses the current standards, guidelines and codes of professional conduct in nursing in Australia. It also elucidates how mobile learning could be included within these documents to enable registered nurse supervisors and undergraduate nurses to access informal learning and CPD. Additionally, this publication demonstrates that nursing could be innovative and lead the registered health professions in development of standards, guidelines and codes of professional conduct. Moreover, this development could include dialogue with the other registered health professional boards to develop a National position on mobile learning at point of care similar to the National social media policy that all registered health professionals need to adhere.

8.2 Publication 11 - Governing Mobile Technology Use for Continuing Professional Development in the Australian Nursing Profession

Mather, CA and Gale, F and Cummings, EA, "Governing mobile technology use for continuing professional development in the Australian nursing profession", *BMC Nursing*, **16** pp. 1-11. doi:10.1186/s12912-017-0212-8 ISSN 1472-6955 (2017)

Abstract

Background: The rapid growth in the use of mobile technology in Australia has outpaced its governance, especially in healthcare settings. Whilst some Australian professional bodies and organisations have developed standards and guidelines to direct appropriate use of social media and mobile technology, clear governance arrangements regarding when, where and how to use mobile technology at point of care in nursing are currently lacking.

Discussion: This paper analyses how the use of mobile technology by nurses at point of care is governed. It highlights the existence of a *mobile technology paradox*: an identified inability of nurses to access mobile technology in a context where it is increasingly recognised that its use in situ can enhance nursing practice while contributing to mobile learning and continuing professional development. While the recent release of the Registered Nurse Standards for Practice and accompanying Standard for Continuing Professional Development provides some direction regarding professional standards to support the use of mobile technology for mobile learning, we argue a more inclusive approach is required if emerging technologies are to be fully embraced. We describe how an implementation framework, underpinned by more detailed standards, guidelines and codes, could enable the nursing profession to be leaders in embedding mobile technology in healthcare environments nationally and globally.

Conclusion: The prevalence of mobile technology in Australia has outpaced its governance in healthcare environments. Its limited availability at point of care is hindering nursing practice, mobile learning and continuing professional development. We discuss the emergence of mobile technology and impediments for its use by nurses *in situ*. We analyse the professional codes governing nursing, outlining potential reforms to enable implementation of mobile technology at point of care by nurses.

Key words: Australia, continuing professional development, digital professionalism, governance, mobile technology, nursing practice, standards, workplace.

Background

This paper examines the degree to which Australia's arrangements governing the use of mobile technology in the workplace in nursing takes into account developments in mobile technology and its potential to contribute to enhanced nursing practice, informal learning and continuing professional development (CPD) in healthcare environments. Enabling health professionals, especially nurses, to utilise mobile technology *in situ* at point of care is essential for workforce development and, by being recognised as CPD, can assist in meeting annual evidentiary requirements for maintaining registration as a nurse (Mather & Cummings 2014). Whilst health institutions will rightly view protecting patient safety as the central task in the evolution of arrangements for deploying emerging digital platforms, nurses also have a role in the development of workplace standards, guidelines and codes of conduct to ensure access to mobile technology improve nursing practice and engagement in mobile learning for CPD becomes embedded at point of care.

The terminology to describe health and informatics is still being standardised (Eysenbach 2001; Katsonis & Botros 2015; Pagliari et al. 2005). For the purpose of this paper, we use the terminology in the following way. Continuing professional development (CPD) is the focus of this paper and refers to the maintenance, improvement and broadening of knowledge, expertise and capability associated with personal and professional qualities required to be a nurse (Nursing and Midwifery Board of Australia

2016a, 2016d). The Nursing and Midwifery Board of Australia (NMBA) provides guidelines about learning activities that can be included as CPD. These activities range from postgraduate studies, conferences, in-service education, journal reading or interactive e-learning (Nursing and Midwifery Board of Australia 2016a). Mobile learning is defined as learning and teaching interactions that take into account the mobility of the learners, learning and technology including mobile hand-held devices such as electronic notebooks, tablets or smartphones (El-Hussein & Cronje 2010; Traxler 2007). The term *in situ* is used to describe mobile learning undertaken on site at the point of care, which is important as accessing information is undertaken in place where the opportunity arises, rather than learners needing to physically go to another place such as a library or desk-top computer to access information. Informal learning, which results from incidental, daily, work-related, family or leisure activities (Organisation for Economic Co-operation and Development 2005), is now recognised as an important element in workforce development and is consequently gaining recognition as a legitimate, assessable learning activity (Halliday-Wynes & Beddie 2009). Finally, we employ the definition by Kaplan and Haenlein (Kaplan & Haenlein 2010: p. 60) of social media as "a group of internet-based applications that build on ideological and technological foundations of Web 2.0 and that allow the creation and exchange of User Generated Content".

The current arrangements governing the deployment of mobile technology within nursing healthcare environments are described in this paper, noting that the use of mobile technology in healthcare settings by nurses have been limited due to a range of systems, organisational and individual factors (Croft, Currie & Lockett 2015; Mather, Marlow & Cummings 2013). We argue, however, this limited uptake is problematic, not only in terms of healthcare outcomes, but also because of missed opportunities for mobile learning which can, in turn, contribute to CPD (Yagasaki & Komatsu 2011). Building on the recent release of the new Registered Nurse Standards for Practice (Nursing and Midwifery Board of Australia 2016c), we argue in favour of methodically embedding the use of mobile technology within them, with further explanation in the accompanying guidelines (Nursing and Midwifery Board of Australia 2016b) and Codes of Professional Conduct for Nurses (Nursing and Midwifery Board of Australia 2016b, 2016c, 2016d). Standardising access to mobile technology has the potential to assist nurses to enhance nursing practice, engage in mobile learning to meet their annual evidentiary requirements for registration, promote student learning, and foster digital professionalism as part of the professional identity formation of nursing health professionals.

The paper is structured as follows: the second section briefly outlines the evolution of digital and mobile technologies in the health sector, before providing an account of the barriers to its current access and use by nurses *in situ* for person-centred care, learning and teaching and CPD. While the identified barriers include a lack of educational preparation, generational differences and workplace culture, we identify the current standards, guidelines and codes of conduct professional for nurses governing mobile technology as a major barrier to its deployment. In section three, we provide an overview of Australia's governance arrangements regarding nursing, focusing on the regulatory, accreditation and professional bodies involved in the development of standards, guidelines and codes of professional conduct. Then, in the fourth section, we present a detailed analysis of the evolution of standards, guidelines and professional codes in nursing, highlighting especially the provisions made for using mobile technology and CPD. The investigation emphasises a significant gap between the growing capacity of mobile technology to facilitate person-centred care and enhance nursing practice, mobile learning, and meeting CPD requirements on the one hand, and the standards, guidelines and codes of conduct governing workplace use of mobile technology on the other hand, thereby acknowledging a mobile technology paradox (Smith & Berg 2011). The key gaps we identify are: unclear guidelines and code of conduct statements regarding the use of mobile technology in the workplace, unclear direction about how mobile technology can be used to enhance nursing practice, and unclear recommendations regarding how mobile learning can contribute to CPD. The paper concludes by specifying more clearly the role of mobile technology and mobile learning within the NMBA Standards, Guidelines and Codes of Professional Conduct, and how these are likely to apply to other disciplines within the registered health professions.

Discussion

The emergence of digital and mobile technology in nursing

Although computing and information systems have been used in healthcare since the 1980s (Saba & McCormick 1986; Sewell 2016), the use of mobile technology in nursing is relatively new. In 1973, Silva, a nurse educator, raised the need for nurses to be more involved in the development of health informatics. She predicted that there would be different approaches to incorporating computers into nursing work and was aware of the educational ramifications of introducing computers and computing into the curriculum for educational and clinical purposes. Silva (1973) was a visionary who articulated that models of practice and learning would need to change as computerisation became more commonplace. She suggested that students be enabled to develop their own individual learning plans and have the freedom to be self-directed in their learning:

> *"Computers have great potential for helping students to learn and freeing teachers to teach. But they must be used prudently and intelligently so that the profession of nursing is enhanced and human dignity and autonomy are not sacrificed"* (Silva, 1973: p 98).

Research on the role of computing in nursing began in the United States in the 1980s (Saba & McCormick 1986) and the first International Medical Informatics Association Working Conference on the Impact of Computers on Nursing was held in England in 1982. As computers became more powerful and reduced in size countries amended legislation to better ensure information privacy and data protection (Thomson 2004). The development of personal digital assistants (PDAs) in the early 2000s enabled learning at point of care and the technology trialled for use in healthcare settings. The use of PDAs for informal learning expanded rapidly as increased access to 3G mobile technology, that supported higher data transfer speeds, became available in the mid-2000s (Ogata & Uosaki 2012; Sewell 2016). During this time access to the Internet through wireless technology also became easier and less costly. The concurrent development of smartphones with media capabilities and digital platforms designed specifically for use with mobile or portable devices further increased penetration of mobile technology in both work and private lives (Goggin 2012; Katsonis & Botros 2015; Pauleen et al. 2015).

Mobile technology has the potential to enhance nursing practice through nurses being able to find or check information about illness, disease or injury, view or revise procedures or care to be undertaken, or ensure correct medications are administered to patients without needing to go to the nurses' station, treatment room or locate a computer terminal to retrieve information (Mather & Cummings 2015). Additionally, promoting patient involvement and encouraging self-management can in real-time, reduce error, prevent duplication, enable correct sequencing of procedures and provide continuity of care by no longer needing to leave the patient. There are also opportunities to use mobile technology to develop rapport with patients, strengthen the nurse-patient relationship and promote a mutuality of learning between students and patients (Mather & Cummings 2015). Enabling sanctioned access to mobile technology will negate the current workaround of nurses 'loitering in their lockers' or 'toilet learning' which currently occurs, when nurses need to find or check information (Mather & Cummings 2015).

Sharples and colleagues (2005) and others (El-Hussein & Cronje 2010; Ogata & Uosaki 2012; Peters 2007; So, Kim & Looi 2008) have explored the convergence of mobile technology with learning and teaching. These authors note that mobile learning is user-centred, facilitating portability, connectivity, interactivity and promoting context-sensitive learning that can be tailored to the individual's preferences or needs (Junglas, Abraham & Blake 2009; Peters 2007). Mobile technology has enabled new ways to communicate and demand is driven by users being motivated to use the technology, because they perceive it 'to be a better fit than alternative methods' (Junglas, Abraham & Blake 2009; Peters 2007). This new andragogy of mobile learning-that is, informal learning opportunities and enhanced social interaction among adult learners - enables nurses to collect, analyse and share data *in situ* across healthcare settings (Peters 2007; So, Kim & Looi 2008). When mobile technology is enabled at point of care, opportunities for informal learning and CPD by nurses are increased securing

benefits for nurses, students and their patients (Mather & Cummings 2016; Mather, Cummings & Nichols 2016; Ross, Barr & Stevens 2013).

Impediments to implementing mobile technology use by nurses in situ

Despite the potential for mobile technology to enhance nursing practice and contribute to mobile learning and CPD, an array of barriers, challenges and risks to realising it, exist within healthcare environments. These include poor educational preparation of student nurses, a failure by management to grasp the potential of mobile technology and the non-inclusion of digital professionalism as part of professional identity formation (Cummings et al. 2016; Noordegraaf, Van der Steen & Van Twist 2014). There are also impediments to realising the potential of mobile technology related to generational differences in interest and competence (Mather, Marlow & Cummings 2013). Each of these impediments is now further elaborated.

Firstly, to be able to confidently engage in sharing information using informatics, nurses need to be educationally prepared in mobile technology skills (Gray et al. 2014). End-user impediments include nurses lacking the confidence, knowledge and skills to use mobile technology out of concern they will make mistakes that breach professional or workplace standards, guidelines or codes (Mather, Marlow & Cummings 2013). Furthermore, educational preparation of peers, colleagues, patients and relatives may also be necessary for implementation of mobile technology use at point of care (Mather & Cummings 2015). Additionally, educational preparation and training of health professionals in developing digital professionalism may be costly (Hodgkin et al. 2016; Smith-Glasgow & Cornelius 2005).

Secondly, previous research on accessing social media and mobile technologies has indicated current behaviour and policies can dissuade the use of mobile technologies for mobile learning by nurses *in situ* (Mather, Marlow & Cummings 2013; Mickan et al. 2013). There also seems to be a disparity within the health professions about whom is allowed to access what information, when and where, using mobile technology, in healthcare settings (Solvoll & Scholl 2008). For example, at the beginning of a shift nurses may be required to forgo access to mobile technology because managers do not trust them to use it appropriately and current standards or code statements do not provide the required guidance (Noordegraaf 2015). Alternatively, there may be organisation guidelines indicating that mobile technology is only allowed to be used during legitimate meal breaks with the healthcare team disapproving of its use at other times (Mather, Marlow & Cummings 2013; Mather & Cummings 2015).

A third impediment is that while recent nursing graduates (aged under 25 years and known as Millennials) generally are comfortable using computers for social networking and web interfacing, this does not necessarily translate to having appropriate informatics skills for use in the workplace (Australian Learning and Teaching Council 2008). This cohort of nurses is used to accessing information immediately and will seek answers through mobile technology rather than use other sources of media such as newspapers (Usher et al. 2014). Also, for these nurses the notion of 'friendship' extends further than geographical boundaries and this enables a connectedness that was not available to previous generations of nurses (Bolton et al. 2013). Digital professionalism can be developed through guidance about appropriate and safe use of mobile technology. For example, the recent development of national social media guidelines (Australian Health Practitioner Regulation Agency 2015b) provides direction for health professionals to manage their social media presence (Cummings et al. 2016). These guidelines legitimise digital connection of students with peers, colleagues and experts or organisations locally, nationally and internationally to assist in remaining contemporary in practice and informed of professional issues.

Despite the potential of the mobile technology to foster digital professionalism, Australia's well-documented ageing nursing workforce (Health Workforce Australia 2013b) creates a fourth, serious impediment to advancing deployment of mobile learning by nurses *in situ* at point of care. In 2014 nearly 31% of all nurses were aged over 50 years (Australian Health Practitioner Regulation Agency 2015a). Experienced registered nurses in the workplace are more likely to be members of cohorts known as 'Baby Boomers' or 'Generation X' (Brunetto, Farr-Wharton & Shacklock 2012). The

implications for the workplace may be profound as these cohorts are less likely to use mobile technology for communication. There may be also be some nurses who choose not to make the transition to include digital professionalism as part of their professional identity because they do not understand the potential of mobile learning *in situ*, or prefer not to undertake CPD while in the workplace (Lindquist et al. 2008).

Governance arrangements in the nursing profession

The rapid growth of health technology and informatics, mobile learning platforms and software applications in healthcare has enabled an increased and diverse range of additional opportunities for learning and teaching in the workplace than previously available (Mather, Marlow & Cummings 2013) with implications at the individual and systems levels for the planning and delivery of care and for supporting life-long learning in healthcare settings (Australian Workforce and Productivity Agency 2012, 2013). However, as noted in the previous section, there are currently several impediments preventing individuals and the system itself from benefitting to the extent possible. In this section, we describe arrangements in the Australian healthcare system to govern the practices of nursing professionals *in situ* noting a key role for standards, guidelines and code of conduct statements in workplace governance arrangements. This section establishes the governance context for a more detailed analysis in the next section of the existing standards, guidelines and codes of conduct with regard to mobile technology, mobile learning and its intersection with CPD.

Under the provisions of the *Health Practitioner Regulation National Law Act 2009*, Australian healthcare professionals are organised into 14 National Boards based on field of practice as accredited by the Australian Health Practitioner Regulation Agency (AHPRA). Today, AHPRA regulates the practice of nearly 640 000 Australian health professionals, with each registered National Board having its own standards, guidelines and codes that describe the requirements necessary for achieving and maintaining registration (Australian Health Practitioner Regulation Agency 2016). Each Of the registered health professions established under the Act, is governed by its own National Board. The Nursing and Midwifery Board of Australia (NMBA) is the professional body that regulates nurses and midwives and is vested with the responsibility of registration and endorsement, professional codes, guidelines, standards and accreditation (Australian Health Practitioner Regulation Agency 2016). These include codes of professional conduct and ethics, guides to professional boundaries, and standards for practice (Nursing and Midwifery Board of Australia 2013a, 2013b, 2013e, 2016a, 2016c, 2016d).

In addition to AHPRA and NMBA, several other organisations play a governing role in the Australian healthcare system that are relevant to mobile technology, mobile learning and CPD. Firstly, the accreditation authority for nursing and midwifery education programs rests with the Australian Nursing and Midwifery Accreditation Council (ANMAC). ANMAC is responsible for the development and review of accreditation standards for nursing and midwifery programs of study, for assessing programs of study and education providers against the standards, and for providing advice to the NMBA regarding standards of education and practice (Nursing and Midwifery Board of Australia). Another organisation with an important governance role is the Australian Nursing and Midwifery Federation (ANMF). ANMF is the largest union in Australia, representing over 249,000 nurses and midwives. Its aim is to advance the industrial, political and professional status of nurses in the broader context of protecting the public and ensuring safe patient care (Australian Nursing and Midwifery Federation 2014a). It is an affiliate of the International Council of Nurses (ICN), an international federation of 130 nursing associations representing over 16 million nurses worldwide (International Council of Nurses 2015a). Both ANMF and ICN have been active in the field of health informatics, with ANMF recently releasing a National Informatics Competency Standards for Nurses and Midwives (Australian Nursing and Midwifery Federation 2014b) and ICN developing position statements on nursing informatics (International Council of Nurses 2009) and social media (International Council of Nurses 2015b).

Three other organisations play a role in governing digital technology in the nursing profession. The Australian College of Nursing (ACN) is the national professional organisation for nurses. It is the collective voice of Australian nurses for influencing policy development and shaping person-centred

care models. All nurses are eligible to become members and it has a number of communities of interest to analyse policy and practice in areas of specialty, and is also a member of the ICN. (Australian College of Nursing 2016). In addition, there are two health informatics bodies with nursing subgroups: The Health Informatics Society of Australia - Nursing Informatics Association (NIA) and the International Medical Informatics Association – Nursing Informatics Special Interest Group (IMIA-NISIG). Both undertake a variety of activities, including developing recommendations and guidelines on health informatics and courses related to nursing informatics (International Medical Informatics Association-Nursing Informatics Special Interest Group 2014), NIA has representation on the IMIA Board. These groups also collaborate internationally, sharing knowledge and information to facilitate communication to develop the field. Whilst these groups provide leadership in nursing informatics, they are yet to be proactive in guiding recommendations for the safe and appropriate use of mobile technology and social media by nurses for learning and teaching at point of care. Figure 9 summarises the institutional arrangements governing Australia's nursing profession.

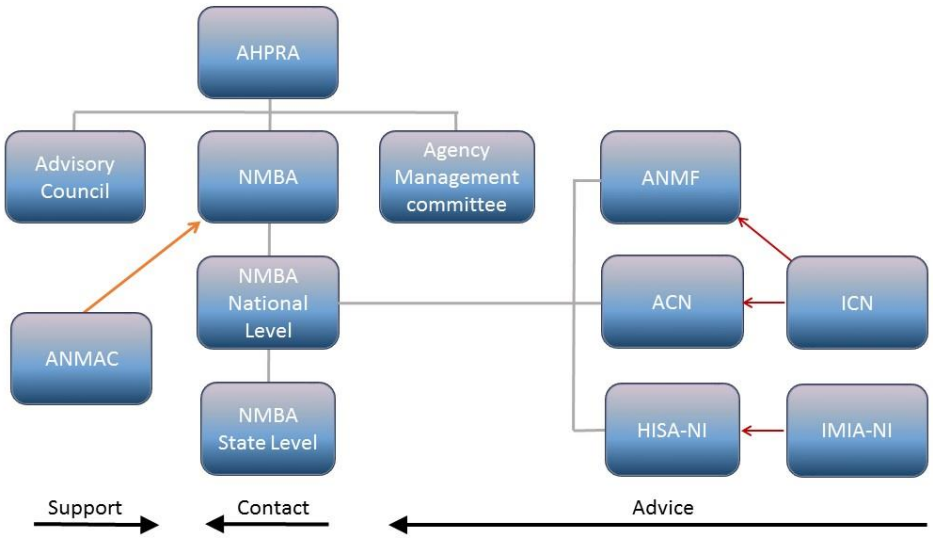

Figure 9. Schematic representation of organisational governance of nursing in Australia (Australian Health Practitioner Regulation Agency 2011) [modified].

A major mechanism by which the various organisations depicted in Figure 9 govern the nursing profession is through the development and revision of a diverse range of professional standards, guidelines and codes. Standards, guidelines and codes characterise the governance of all professions including promoting individual competence and integrity, distinguishing practitioners from charlatans, managing disputes and maintaining a social license for continued self-regulation (Higgs-Kleyn & Kapelianis 1999). Such standards and guidelines also facilitate management to 'govern at a distance' in a context in which complex tasks must be performed with minimum oversight according to a set of professional norms. In the case of nursing, for example, the NMBA developed the *Competency Standards for the Registered Nurse* in 2006 (ANMC rebranded) and these have been recently updated and renamed the *Registered Nurse Standards for Practice* (hereafter RN Standards) (Nursing and Midwifery Board of Australia 2016c). It has also recently revised its *Registration Standard: Continuing Professional Development* (Nursing and Midwifery Board of Australia 2016d) (hereafter CPD Standard). Both these standards are authoritative, given they have been developed by AHPRA, the body responsible for governing the Australian nursing profession. They have considerable force since a failure to abide by the RN Standards or the CPD Standard can be justification for non-registration or deregistration from the profession, damaging an individual's professional reputation and potentially threatening their capacity to earn a living. Nursing is a highly regulated profession and

individuals are governed by the Code of Professional Conduct for Nurses in Australia (Nursing and Midwifery Board of Australia 2016d) which provides guidance for the expected minimum standards for practice as a professional person within and outside the professional domain of nursing. This Code together with the Code of Ethics (Nursing and Midwifery Board of Australia 2013a) and Code of Professional Boundaries (Nursing and Midwifery Board of Australia 2013c) inform the community, consumers, regulatory and professional bodies and employers of professional conduct expected to be upheld, and for evaluating professional conduct of nurses (hereafter known as Codes). The Codes (Nursing and Midwifery Board of Australia 2013b, 2013e) and RN standards (Nursing and Midwifery Board of Australia 2016a, 2016b, 2016c, 2016d) provide a framework for accountability and responsibility of nurses in all settings (Nursing and Midwifery Board of Australia 2013b).

In addition to these Codes, RN and CPD Standards, ANMAC has established standards for accrediting programs of study in the nursing profession, the '*Standards and Criteria for the Accreditation of Nursing and Midwifery Courses Leading to Registration, Enrolment, Endorsement and Authorisation in Australia'* (Accreditation Standard) (Australian Nursing and Midwifery Accreditation Council 2012), which it employs to assess the performance of educational institutions. Similar to the NMBA, ANMAC's Accreditation Standards have considerable authority, the risk to education institutions being their accreditation will be suspended or possibly cancelled if a review finds significant non-compliance. Finally, ANMF is also seeking to influence the nursing profession through standards and guidelines, having developed '*Nursing Guidelines: Management of Medicines in Aged Care'* (Australian Nursing and Midwifery Federation 2013b) and '*Guidelines for Telehealth On-Line Video Consultation Funded through Medicare'* (Australian Nursing and Midwifery Federation 2013a). However, unlike either NMBA or ANMAC, ANMF's guidelines are not supported by legislation and the organisation lacks the same level of regulatory authority rendering its guidelines voluntary, not mandatory.

NMBA's recently released RN Standards (Figure 10) (Nursing and Midwifery Board of Australia 2016c: p. 2) establish a matrix that relates the three elements of critical thinking, therapeutic and professional relationships, and capacity to practice with the four dimensions of nursing practice (conducting assessments, developing a plan, providing treatment and assessing outcomes). The matrix is used to assess registered nurses who need to show they maintain capability for practice, as a guide and measure for developing capability in nursing students, and also need to be evident in nursing practice and "*inform the development of the scopes of practice and aspirations of RNs*" (Nursing and Midwifery Board of Australia 2016c: p. 1). The RN Standards provide direction to nurses and nurse educators for practice, when in practice, and for the purposes of continuing professional development. The RN Standards are interconnected and have criteria that specify how that standard can be demonstrated, need to be interpreted in the context of each registered nurse's practice, and are designed to enable rather than limit the development of the registered nurse scope of practice. Person-centred and evidence-based practice are fundamental within the RN Standards.

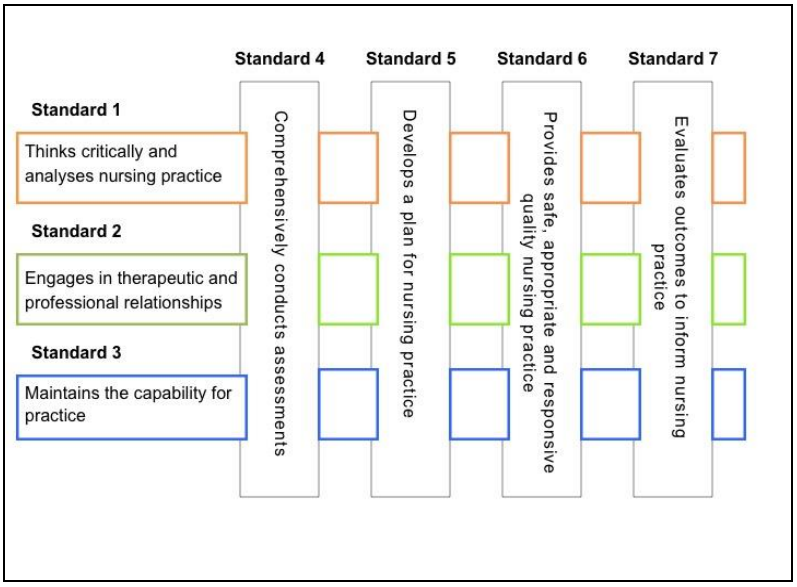

Figure 10. The Registered Nurse Standards for Practice (Nursing and Midwifery Board of Australia 2016c: p. 2)

To better understand how the Standards operate, consider Standard 1, which states: 'Thinks critically and analyses nursing practice'. Within this standard, criterion *(1.1) states that a nurse* '*accesses, analyses, and uses the best available evidence, that includes research findings, for safe, quality practice'* (Nursing and Midwifery Board of Australia 2016c: p. 3). To demonstrate compliance with this criterion *in situ*, conventionally a nurse would need to ensure they have a sound understanding of routine care of a person presenting with an injury or illness and be prepared to find or check appropriate management and care if unsure. Verification could include seeking evidence-based information at the nurses' station by obtaining information in a book, manual or at a desk-top computer. An expert or experienced nurse may also be consulted regarding management and care of this person. In another example, Criterion (1.6) *requires that a nurse 'maintains accurate, comprehensive and timely documentation of assessments, planning, decision-making, actions and evaluations'* (Nursing and Midwifery Board of Australia 2016c: p. 3). To maintain this standard currently, a nurse depends on memory when completing the necessary documentation at the nurses' station into hardcopy notes or into an electronic health record via a desk-top computer or computer on wheels.

The CPD Standard states for continuing registration there must be documented evidence of a minimum number of 20 hours of CPD is undertaken annually or pro-rata depending on the proportion of months employed during the year (Nursing and Midwifery Board of Australia 2016d). The CPD Standard describes formal and self-directed activities that are acceptable, which include conventional activities such as attending conferences, reading articles, and participating in relevant professional workshops. Information required to demonstrate completion of CPD requirements includes the identification of learning needs and development of an action plan, as well as evidence regarding the type, description and reflection on the activities undertaken (Nursing and Midwifery Board of Australia 2016a). Each year at registration, approximately five per cent of nurses are randomly audited by the NMBA on behalf of AHPRA, a process designed to ensure a degree of accountability that nurses and midwives have completed their CPD requirements and meet the mandatory RN Standards. Audited individuals need to provide documentary evidence that they have undertaken the required activities mandated in the CPD Standard, the final audit report being published by the NMBA (Australian Health Practitioner Regulation Agency 2015a).

Governance of mobile technology for mobile learning and CPD in the Australian Nursing profession

While the above Standards describe the expected practice of nurses with regard to a broad range of activities, it is specifically what they permit *in situ*, that is critical in terms of being able to access mobile technology to enhance nursing practice, engage in mobile learning, and be included towards meeting CPD requirements. The difficulty is, that while the Standards do not prohibit the use of mobile technology at point of care, neither do they specifically encourage it, leaving it up to the workplace to decide on whether, when and how nurses will be able to access mobile technology. To understand more clearly how the RN Standards approach mobile technology, consider Standard 3, '*Maintaining the capability for practice',* where the most potential exists for the integration of mobile learning to enhance nursing at point of care. Criteria *(3.2), which states that 'the information and education required to enhance people's control over health'* is provided, creates the opportunity for mobile technology and mobile learning to directly contribute to achieving this criteria, within the Standard (Nursing and Midwifery Board of Australia 2016c: p. 4). As written, however, the Standards contains no specific guidance to nurses or healthcare organisations regarding the safe and appropriate use of mobile technology for mobile learning or CPD by nurses within healthcare environments, perpetuating the mobile technology paradox. Implicitly, there is no recognition that mobile technology and mobile learning have the capability to promote ehealth literacy and patient self-management.

In conjunction with the inception of the RN Standards there were corresponding amendments to the CPD Standard and guidelines (Nursing and Midwifery Board of Australia 2016a, 2016d) to align with the new RN Standards (Nursing and Midwifery Board of Australia 2016c). The types of CPD that can be undertaken remain unchanged, and state "the type of learning activities selected can be broad and varied. Registrants are encouraged to consider the combined use of multimedia and multiple instruction techniques, e.g. face-to-face, simulation, interactive e-learning, (and) self-directed learning" (Nursing and Midwifery Board of Australia 2016a: p. 2). Similarly, to the RN Standards, the use of mobile technology or mobile learning is not explicitly mentioned in this CPD Standard, although neither is it excluded as a legitimate method, that could be used to augment any formal learning plan to achieve learning goals for completing CPD.

The relative absence of mention of mobile technology in the RN and CPD Standards contrasts the specific inclusion in ANMAC's Accreditation Standards for nursing programs. Health technology and informatics are specifically referred to in Standard 4 concerning program content (Australian Nursing and Midwifery Accreditation Council 2012). A 2014 explanatory note provides further clarification about the expectations required for accrediting nursing programs, stating that health technology and informatics must be included at a technical, contextual and emancipatory level within curricula (Australian Nursing and Midwifery Accreditation Council 2014). The Accreditation Standard requires institutions offering programs of study in nursing to provide evidence they are enabling information literacy which includes the development of knowledge and skills in informatics within the course and at the workplace. To date, the Accreditation Standards provide the strongest support for the use of mobile technology at point of care. However, until standards, guidelines and codes for registered nurses reflect support for ANMAC's vision of improving capability in health technology and informatics within the nursing profession, the current mandate will not be achieved.

The release of the ANMF National Informatics Standards for Nurses and Midwives (Australian Nursing and Midwifery Federation 2014b) provides the nursing profession with further context about the expectation of nursing using health technology and informatics. This document provides cues about what health technology and informatics competency is required within each of the, now superseded, competency standard domains of the NMBA's previous standards (Nursing and Midwifery Board of Australia 2010). However, the ANMF Standards remain voluntary and there is no expectation from organisations or nurses that they will become binding.

Governing for mobile technology use in situ in nursing: the need for an implementation framework

If nurses are to employ mobile technology *in situ* more direction is required than currently provided in existing standards, guidelines and codes governing nursing practice, professional conduct and CPD requirements. Unfortunately, nurses are unable to build on the published Standards and guidelines in operation in other health professions. Of AHPRA's 14 registered health professions, only physiotherapy and medicine specifically acknowledge the use of electronic media within healthcare work. Within the *Code of Conduct* for physiotherapists (Physiotherapy Board of Australia 2014), for example, there are definitions of 'electronic' and 'social media' and 'ehealth' are mentioned as part of patient confidentiality and privacy, however, there is little explicit direction regarding its use *in situ* or for CPD (Physiotherapy Board of Australia 2014). Likewise, while the profession of medicine has developed specific guidelines for '*Technology-based patient consultations'* (Medical Board of Australia 2012) - which includes provision of a definition of technology-based consultations, standards of patient care, and direction for good medical practice using technology - mobile technology is not specifically mentioned. Online learning can be included in medicine's CPD Standards, though the criteria specify that other activities must also be undertaken for satisfactory completion of CPD.

As these examples reveal, none of the health professions' standards, guidelines or codes comprehensively and systematically addresses the issue of the use of mobile technology *in situ* to enhance practice, facilitate mobile learning and meeting CPD requirements. While nursing has an opportunity therefore to influence other registered health professions by leading implementation of access and use of mobile technology into current NMBA standards, guidelines and codes, it will require a layered implementation framework and leadership to achieve it (Fixsen et al. 2005).

Our implementation framework recognises the very recent publication of the new RN and CPD Standards (Nursing and Midwifery Board of Australia 2016a, 2016b, 2016c, 2016d) constitute a barrier to being immediately updated to include mobile technology. While revision of these standards would be the most efficient way forward, there are other options. For example, the promotion of mobile technology in nursing can be partially achieved by undertaking reforms to the existing Codes (Nursing and Midwifery Board of Australia 2013b, 2013c, 2013e) and Accreditation Standards (Australian Nursing and Midwifery Accreditation Council 2012). Moreover, the strategy we set out below would ameliorate the current situation and enable implementation of mobile technology at point of care. This strategy could also provide impetus for other registered health profession Boards to consider inclusion of mobile technology at a national level, rather than within each of the registered health professions.

Commencing with ANMAC, there is an opportunity to revise its Accreditation standard (Australian Nursing and Midwifery Accreditation Council 2012) because the Independent Review of the National Registration and Accreditation Scheme for Health Professionals (Australian Health Ministers Advisory Council 2014a, 2014b) recommended that an evaluation of accreditation processes be undertaken in 2017 to address costs, governance and duplication across the health professions. Any revision of the ANMAC Accreditation Standards should build on its current health technology and informatics provisions to mandate mobile learning as a legitimate nursing function in the workplace. The explanatory note regarding the implementation of health technology and informatics into the curriculum (Council 2014) as part of Standard 4 could also become more overtly embedded into the criteria of each of the current relevant accreditation standards. For example, Accreditation Standards 2 and 3 related to curriculum design and content need to explicitly elucidate the legitimacy of mobile learning on- and off-campus providing it is appropriate and safe to do so.

Our implementation framework also includes revisions to two of the three professional Codes. As discussed earlier, the Code of Professional Conduct for Nurses in Australia (Nursing and Midwifery Board of Australia 2013c) is comprised of ten statements accompanied by explanations using examples to demonstrate their meaning. These explanations need to be reviewed to include support for implementation and expression of safe and appropriate use of mobile technology. Guidance through clarification and support of health technology and informatics as well as the explicit legitimisation of mobile learning for enhancing nursing practice, mobile learning and CPD is also

necessary. The revision of these explanations in the appropriate statements could ameliorate the lack of current guidance within the RN and CPD Standards (Nursing and Midwifery Board of Australia 2016a, 2016b, 2016c, 2016d). For example, Conduct Statement 1: '*Nurses practice in a safe and competent manner'*, could include an explanation about how nurses can and cannot use mobile technology to ensure patient safety is maintained. Additionally, the Code statements (Nursing and Midwifery Board of Australia 2013c) need to expressly include digital professionalism to advance the sanctioning of using mobile technology, for mobile learning and CPD at point of care, within healthcare environments. Conduct statement 10: '*Nurses practise nursing reflectively and ethically'* (Nursing and Midwifery Board of Australia 2013c: p. 5) provides an example where the inclusion of an explanation about the need to develop, maintain and promote modelling of digitally professional behaviour could progress the implementation of mobile technology.

In *the Code of Professional Boundaries'* (Nursing and Midwifery Board of Australia 2013b) revisions could be made to enable nurses to determine for themselves when it is safe and appropriate to use mobile technology. This can be achieved by adding a statement about using mobile technology for enhancing nursing practice, mobile learning or CPD only when it is safe and appropriate to do so in the section describing the *'Guiding principles for safe professional practice, context – Therapeutic and care relationships'* (Nursing and Midwifery Board of Australia 2013b). The associated schematic flowchart, known as the '*Decision making tool-professional boundaries'* (Nursing and Midwifery Board of Australia 2013b: p.4) could be used to provide context, and determine professional boundaries when choosing to undertake a proposed behaviour or activity, in this case whether it is safe and appropriate to engage in using mobile technology, *in situ* at point of care.

The last component of the implementation framework would be development, through AHPRA, of national guidelines for the use of mobile technology at point of care. Given the majority of the other registered health profession standards, guidelines and codes provide little or no direction on the use of mobile technology, it would be of benefit to encourage a wholistic approach towards inclusion of mobile technology into national policy, similarly to the recently published Social Media guidelines (AHPRA 2015a). There is therefore an opportunity for the NMBA and ANMAC to promote the development of national mobile technology guidelines for all of the registered health professions. Such an approach would be consistent with the recommendations of the Independent Review of the National Registration and Accreditation Scheme for Health Professionals (Australian Health Ministers Advisory Council 2014a, 2014b), which noted the need for the National Boards to adopt more effective, standardised governance through consolidation of functions, including standard setting, and also to promote cost savings. This recommendation has the potential to enable the nursing profession at Board level to influence the other health professions regarding a standardised approach to using mobile technology in the workplace and for CPD. Similar to the Social Media guidelines (Australian Health Practitioner Regulation Agency 2015b), this national approach to embedding mobile technology as a sanctioned activity *in situ* at point of care creates opportunity for full implementation of mobile technology to enhance the practice of health professionals, promote mobile learning and enable CPD for maintaining registration as a health professional.

Conclusion

The current lack of direction in the governance arrangements for nurses regarding mobile technology use *in situ* is impeding nursing practice, mobile learning and restricting opportunities for enabling CPD in the workplace. This is cause for concern as it constrains understanding of the potential of using mobile technologies to enhance nursing practice and as learning and teaching tools for both undergraduate and graduate health professionals. Further intervention studies to identify appropriate implementation, effective use and minimise risks associated with using mobile technology within healthcare environments is warranted to ensure standards, guidelines and codes reflect an unbiased approach to ameliorating the risks while promoting the benefits of this new technology and andragogy. Consideration of the benefits, barriers, risks and challenges of embedding mobile technology within healthcare settings needs to be carefully balanced to ensure patient safety and health outcomes are protected. Mobile technologies are ubiquitous in our environment and this acceptance needs transference into the workplace for the benefit of all stakeholders. However, there is

an urgent need for guidance across the health professions, especially in nursing, where current registration and CPD standards, guidelines and codes about the use of mobile technology at point of care is impeding implementation of mobile technology as a legitimate nursing function. The development of clear guidance at a systems level will enable organisation and individual layers of implementation to be progressed, to ensure appropriate use of these technologies by nurses within healthcare environments.

8.3 Commentary on Chapter 8

As shown by this research there is a lack of governance regarding the use of mobile or portable devices or mobile learning or at point of care in healthcare environments. This absence of clear direction has resulted in a lack of clarity at an organisation or individual level that has contributed to limited acceptance of mobile learning by healthcare organisations and nurses. The inadequacy of governance at a systems level outlined in this chapter provides evidence that contributes to answering research question 2:

> *RQ2: What is the impact of current governance structures on mobile learning in situ, at point of care?*

Deficiency in direction is a contributing factor to the slow acceptance of mobile learning by nurses at point of care. The research contributes to answering this second research question by examining Australian governance structures within the profession of nursing. Research objective 1 contributes to answering this second research question:

> *RQ2 RO1: How is mobile learning at point of care is governed at a systems level?*

This chapter is the first within Phase 2 of the research, which reflects the pragmatic approach by shifting to evaluating potential actions, while having regard for the potential consequences of incorporating mobile learning into governance at an organisation and system level. This chapter also provides suggestions for addressing the situation shown by the research domain.

Chapter 9 Nursing profession organisations and mobile learning

Omnia fert aetas

Time brings all things

(Publius Vergilius Maro)

Exploring the influence of nursing profession organisations on shaping mobile learning policy development in Australian healthcare environments was undertaken as part of Phase 2 of the research. Thematic analysis of interviews with representatives from nursing profession organisations revealed the emergence of four themes. These were risk management, stakeholder perceptions, connectivity and timing. All four themes must be present and available to enable mobile learning by nurses at point of care. This chapter discusses the barriers, risks and challenges of enabling mobile learning by nurses in healthcare environments from an organisation perspective. An insufficient level of agency and reluctance of nurse leaders to promote change to advance nursing practice was found to be a challenge that has impacted mobile learning at an individual level. This chapter is divided into the following sections:

- Section 9.1 provides an introduction to article 12; which reports how current governance structures impact on mobile learning from the perspective of nursing profession organisations;
- Section 9.2 presents article 12 - *Advancing mobile learning in Australian healthcare environments: Nursing profession organisation perspectives and leadership challenges*; and
- Section 9.3 provides commentary on Chapter 9 and its contribution to answering research question 2, research objective 2.

9.1 Introduction to article 12

Findings of interviews with representatives from nursing profession organisations are presented. There was minimal impact of nursing profession organisations on mobile learning policy development for informal learning and CPD in healthcare environments. Representatives indicated they did not consider promotion of mobile learning as their responsibility as it was not a focus within the aims or objectives of their specialty organisations. Lack of governance at a systems level regarding using mobile technology for learning contributes to this perspective because if there is no access to informal learning or CPD at point of care, it is not a high priority to promote nursing profession organisation information using this method. The findings concurred with previous research, which indicated there is a *mobile learning paradox*. Confusion within Australian healthcare environments regarding access and use of mobile technology for learning is apparent at an organisation level.

9.2 Article 12 - Advancing mobile learning in Australian healthcare environments: Nursing profession organisation perspectives and leadership challenges

Ready for submission for peer review for publication to BMC Nursing:

Mather, C, Cummings EA and Gale, F. “Advancing mobile learning in Australian healthcare environments: Nursing profession organisation perspectives and leadership challenges”.

Abstract

Background: Access to, and use of, mobile or portable devices for learning at point of care within Australian healthcare environments is poorly governed. An absence of clear direction at systems, organisation and individual levels has created a mobile learning paradox, whereby although nurses understand the benefits of seeking and retrieving discipline or patient-related knowledge and information in real-time, mobile learning is not an explicitly sanctioned nursing activity. The purpose of this study was to understand the factors influencing mobile learning policy development from the perspective of professional nursing organisations.

Methods: Individual semi-structured interviews were undertaken with representatives from professional nursing organisations in December 2016 and January 2017. Recruitment was by email and telephone. Qualitative analysis was conducted to identify the key themes latent in the transcribed data.

Results: Risk management, stakeholder perceptions, connectivity and timing were key themes that emerged from the analysis, collectively identifying the complexity of innovating within an established paradigm. Despite understanding the benefits and risks associated with using mobile technology at point of care, nursing representatives were reluctant to exert agency and challenge traditional work patterns to alter the *status quo*.

Conclusions: The themes highlighted the complexity of accessing and using mobile technology for informal learning and continuing professional development. Mobile learning cannot occur at point of care until the factors identified are addressed. Additionally, a reluctance by nurses within professional organisations to advance protocols to govern digital professionalism needs to be overcome. For mobile learning to be perceived as a legitimate nursing function requires a more wholistic approach to risk management that includes all stakeholders, at all levels. The goal should be to develop revised protocols that establish a better balance between the costs and benefits of access to information technology in real-time by nurses.

Keywords: Agency, continuing professional development, digital professionalism, governance, mobile learning, mobile technology, nursing, point of care.

Introduction

The use of mobile technology to access information in real-time is ubiquitous in modern life. Digital knowledge transfer is an outcome of using mobile technology that is currently underutilised in Australian healthcare settings (Mather & Cummings 2015). Harnessing mobile learning to augment traditional andragogies in healthcare environments by stakeholders, especially nurses, has been slow. Previous studies to explore the lack of mobile learning at point of care by nurses have been undertaken (Mather & Cummings 2015, 2016, 2017). Focus group studies with nurse supervisors and online surveys with students have uncovered barriers, challenges, risks and benefits to nurses and undergraduate students of being able to access and use mobile technology for learning at point of care (Mather & Cummings 2016, 2017; Mather, Cummings & Allen 2013). Analysis of the Registered Nurse Standards for Practice (Nursing and Midwifery Board of Australia 2016c) and professional Codes of Conduct (Nursing and Midwifery Board of Australia 2013a, 2013b) have revealed an absence of guidance to support this adjunct method of learning.

The aim of this study was to explore the factors influencing the governance of mobile technology at point of care for informal learning and continuing professional development (CPD) from the perspectives of representatives of professional nursing organisations. Barriers, risks, challenges and benefits to using mobile technology by nurses at point of care have been identified at individual, organisational and systems levels (Lluch 2011; Mickan et al. 2013; O'Connor & Andrews 2015; Raman 2015). Inadequate governance of the registered health professions regarding access and use of mobile technology for learning has created further disruption to healthcare provision by health professionals (Mather & Cummings 2017). The inability of nurses to use mobile technology for informal learning and CPD at point of care in Australia hinders these members of the profession from meeting the annual learning requirements for registration as a nurse (Mather, Gale & Cummings

2017; Nursing and Midwifery Board of Australia 2016b). Additionally, the lack of legitimate access to mobile learning prohibits nurses from guiding and supporting student nurses and modelling digital professionalism, while undertaking work integrated learning within healthcare environments.

Clear direction regarding governance of mobile technology for leisure and learning within healthcare settings remains unaddressed at a systems level in nursing, with flow-on effects impacting at the organisation and individual levels. While nursing informatics is now an essential component of the undergraduate nursing curriculum (Australian Nursing and Midwifery Accreditation Council 2012, 2014), students and registered nurses are not formally or consistently taught digital professionalism. In the resulting confusion regarding appropriate and safe use of mobile technology at point of care, opportunities arise for advertent and inadvertent professional transgressions to occur (Green 2017). The blurring of public-private boundaries in healthcare environments generates organisational risks and potential adverse media attention if nurses make poor choices regarding access and use of mobile technology. Fear of litigation has negatively impacted the ability of nurses to access mobile technology in the workplace as organisations have dissuaded its use. Paradoxically, however, nursing is consistently reported to be the most trustworthy profession (Morgan 2016), with nurses depended on to provide complex nursing care and administer controlled substances such as Schedule 8 medications, yet are not trusted with carrying a mobile device to access information at point of care (Ferguson 2013; Mather & Cummings 2015).

Nurses are the largest group within the registered health professions in Australia (Health Workforce Australia 2013b), making it costly for organisations to educationally prepare their nursing workforce to become proficient in using mobile technology at point of care. However, a digitally capable workforce will be also be able guide the new generation of nurses to become digitally professional and minimise the potential risks associated with using digital media. Upskilling the nursing workforce will also contribute to lessening the current confusion whereby undergraduate students can use mobile technology for learning (Cummings et al. 2016; O'Connor & Andrews 2015) except during work integrated learning (Mather & Cummings 2014). Promotion of congruency in mobile learning opportunities across the profession is now necessary if nursing is to remain contemporary and continue to be viewed by the public as a trustworthy profession (Morgan 2016; O'Connor et al. 2017).

Research on generational cohorts has previously focused on the retiring 'Baby Boomers' (1946-1964) who were vested with the responsibility of initiating digital technology into occupations (Skiba 2010) and 'Generation Y'(1982-1995) who have grown up with access to digital technology and are currently entering the workforce (Brunetto, Farr-Wharton & Shacklock 2012; Skiba & Barton 2006). However, there is now research indicating 'Generation X' (those born between 1965 and 1982) are hindering the installation of mobile technology into healthcare environments. Christopher and colleagues (2017) report Generation X nurses in senior management positions believe they have insufficient formal powers to be innovative within healthcare environments. This lack of influence may manifest as an inability to promote mobile learning as a legitimate nursing function (Carroll & Bruno 2016). Research about 'Generation Y' indicates a dislike of hierarchy (Brunetto, Farr-Wharton & Shacklock 2012). This aversion exhibits as Generation Y being reluctant to challenge existing work structures, including those activities that could promote a 'learning organisation' (Christopher et al. 2017; Senge 1990) This generational dissonance regarding structural empowerment may contribute to the lack of agency demonstrated by nurses to lead implementation of mobile learning as a legitimate nursing function.

Mobile technology enables individuals to seek and retrieve information in real-time that can aid in decision-making that could potentially improve patient outcomes (Cader, Campbell & Watson 2009; Kim 2016). Access to information at point of care also has the potential to improve workflow. Westbrook and colleagues (2011) quantified patterns of task time distribution and found nurses completed an average of 72.3 tasks per hour which over time became more fragmented and interrupted, creating potential safety concerns. Deployment of mobile learning has the potential to reduce this fragmentation by enabling continuity of care of patients, as nurses would not need to leave the bedside to check or clarify information. This study targeted representatives from nursing profession organisations to explore the factors influencing the use of mobile technology for informal learning and CPD.

Methods

Design

This research is interpretive description as discussed by Thorne (2016) and draws on the work of Creswell (2003), and Corbin and Strauss (2008) by using purposive sampling and employing a reflexive approach within a systematic framework to code, label and categorise the data to enable analysis.

Participants and recruitment

Purposive sampling was used to recruit participants from a range of nursing profession organisations. Inclusion criteria for interview were being a nurse employed or belonging to a nursing profession organisation, able to represent the organisation from a policy or guideline perspective and having expertise in nursing practice. A potential list of organisations was generated (CM and EC) that included National (n=7) and Coalition of National Nursing and Midwifery Organisations (CoNNMO) member (n=55) organisations. Invitations were sent to the contact emails provided via the national organisation or CoNNMO website (n=52). If no response was received within two weeks, a follow-up telephone call was made. If there was no telephone contact details available, a further email was sent to the same address. A reminder email was despatched one month after the initial email invitation. An information sheet was provided as an attachment to the email invitation and consent to participate was recorded prior to the beginning of the recorded interview as per ethics protocol for approval (H0016097).

Data collection

Interviews with participants were conducted and recorded using Skype for Business, at a mutually agreeable time using a semi-structured schedule as a guide. Data was obtained by using Skype for Business recording management tools as an MP4 file, which due to large file size were converted to an MP3 file for transcription purposes. Interview questions were designed to establish whether the nursing profession organisations had a policy position on mobile technology for informal learning and CPD and then to explore factors impacting the use of mobile technology for learning at point of care. The interview schedule was informed by previous research (Mather, Carey & Cummings, Elizabeth 2017), and developed by two researchers (CM and EC). Prompts and potential probing questions were included in the schedule to maintain congruency of questioning.

The interviews were conducted during December 2016 and January 2017, took between 17.29 and 54.29 minutes (mean 34.05 minutes) and were transcribed verbatim. Variations in interview length was due to availability or style of engagement by some participants.

Data analysis

A systematic and organised process was developed consisting of trial coding with member checking and development of a codebook that provided a framework of codes. Auditing of codes and reviewing previous interviews to ensure consistency of application of labels across interviews was conducted during the process of coding. Thematic analysis was undertaken by coding ‘meaning units’ as ‘open codes’ (Elliott & Timulak 2005). ‘Meaning units’ were tabulated in Microsoft Excel (2016), from which data was labelled and reduced from open to axial and finally to selective codes to enable the sub-themes to be revealed. This process of labelling and reducing the phrases by coding enabled further refinement of the data to become four core themes. Constant comparison was undertaken by two of the authors (CM and EC).

Rigour

The interviewer (CM) familiarised herself with the schedule to ensure the interview process flowed and enabled probing questions and prompts to be less rehearsed. The interviewer was aware of the lack of body language cues and maintained a neutral, but encouraging dialogue with participants (Alshenqeeti 2014). At the conclusion of each interview, interviewees were asked if they had any

further information they would like to add. This opportunity enabled participants to raise any issues or information that had not been discussed during the interview. The accuracy of the transcriptions were confirmed by reading and listening to the audio recordings of the interviews simultaneously by the interviewer. At the conclusion of each interview, participants were offered the opportunity to check the transcription for errors. Familiarisation with the data was undertaken by listening to the interviews. This process minimised potential for error and ensured accuracy of the data collected.

Ethics

Ethics approval was gained from The University of Tasmania Social Sciences Human Research Ethics Committee (H0016097) prior to commencement of the study as required under Australia's National Statement on Ethical Conduct in Human Research (Australian Government 2007).

Results

Participant demographics

Six interviews were conducted during the study period (Table 12). Participants identified themselves as senior registered nurses holding executive positions within the listed organisations. The six participants were senior members of the nursing profession, who through their careers had a broad range of nursing experiences in a variety of healthcare settings. They were paid employees, or were volunteers within Australian nursing specialty organisations that were members of CoNNMO.

Table 12. Participant demographics

Interview	Nursing organisation	Nurse role	Source of recruitment	Gender
1	National representative (Executive)	Administration	Direct email to organisation	F
2	Specialty nursing Executive position (volunteer organisation)	University academic and clinician	Via email from CoNNMO secretariat*	M
3	National representative (Executive)	University academic	Direct email to organisation	F
4	Specialty nursing Executive position (volunteer organisation)	Clinician	Via email from CoNNMO secretariat	F
5	Specialty nursing Executive position (volunteer organisation)	Administration and clinician	Via email from CoNNMO secretariat	M
6	National representative (Executive)	Administration	Direct email	F

CoNNMO* Coalition of National Nursing and Midwifery Organisations.

Gaining access to appropriate nursing representatives to seek participation proved problematic owing to the complexity of the national organisations targeted or voluntary nature of the membership to nursing specialty organisations. The lead time required to obtain national organisation permission to interview varied. Requests for interviewing a representative from the organisation needed to be taken to appropriate internal meetings to be considered. Feedback from organisations was sought, after meetings were held to discuss the interview request. However, reaching an appropriate representative for interview remained complicated. One organisation declined to participate due to a decision made by the organisation Director. Access to nursing speciality organisation representatives affiliated with CoNNMO was *ad hoc*, owing to the volunteer nature of many nursing specialty organisations. The voluntary nature of these organisations was apparent by irregular monitoring of email accounts, so non-acknowledgement or response from point of entry was common. However, initial and follow-up contact was undertaken as per ethics protocol. The complexity of gaining access to National representatives and the poor response from voluntary organisations impacted the capacity to recruit interviewees. In addition, the release of the Australian College of Nursing, Health Informatics Society of Australia and Nursing Informatics Australia joint draft position statement on health informatics in February 2017 resulted in cessation of recruitment as the researchers believed it could influence the responses of future participants.

Themes

Four key themes emerged from the data analysis, revealing the complexity of factors that influence governance of mobile learning at point of care in healthcare environments in Australia. These themes were: 1) risk management; 2) stakeholder perceptions; 3) connectivity; and 4) timing. Addressing all four themes was found to be imperative for enabling mobile learning at point of care.

Risk Management

Participants acknowledged there was a lack of governance at a wider systems level that negatively impacted their capacity to use mobile technology at point of care. They indicated the belief that mobile technology was not allowed within healthcare settings. The belief was expressed that the non-use of mobile technology had developed historically, with one participant stating:

> *"We also had, I think we've still got some of the misconceptions around the risks with mobile devices and medical devices"* (Participant 2).

Another influence on the lack of direction regarding mobile learning within organisations was attributed to generational cohorts. One participant reported:

> *"But we have to overcome the establishment, the bureaucracy in the health system that actually sees this as a bad thing, that oh no, they're going to be on social media and they're all going to be doing bad things and this instant thought that the internet is just this bad place and no good will come of it. I think some of the older directors of nursing and all that sort of stuff, who are all basically starting to retire now sort of are making way for a younger generation of directors of nursing who we hope is going to have a better or a more positive approach to this"* (Participant 5).

Representatives described factors that have influenced organisations to implement policies or local rules within organisations excluding the use of mobile technology. Participants cited organisations formally and informally dissuading nurses from using mobile technology at point of care. This was expressed by one representative who stated:

> *"But the nurses I find, whether it's just that they're more regulated, are not encouraged to use their phones in the actual clinical environment"* (Participant 4).

Interviewees also reported there was inconsistency of access and use, which created confusion for nurses within organisations as shown by this comment:

> *"But unfortunately, it's such a reactive approach rather than proactive approach, in that they're not - it's actually, "Well, the technology's great, most people are using it appropriately but you can't stop every - you know, don't stop everybody from using it because some people have been not doing the right thing"* (Participant 3).

They also acknowledged incongruency with using mobile technology for patient care, clinical decision-making and the lack of capacity for seeking and retrieving information at point of care. Nurses expressed concern over the lack of direction provided to the profession at a National level, which then impacted at an organisation level. Participants provided examples of other health professionals' expectations of nurses being able to access mobile technology even when organisational policy precluded its use. One participant stated:

> *"But then, as I said, there's that conflict between, we're encouraged to have those things on our phone but we're not allowed to really use them on the ward. So, there is an issue around that, that you will send a photo to a consultant and actually, that is written into policy that that's a breach of that particular policy; you're not allowed to send patient's photos on personal devices"* (Participant 4).

Interviewees also revealed that although there was little formal direction at a systems level on whether mobile technology could be used, some nursing staff were beginning to challenge the apparent edict to drive change:

> *"What they have now, so we're living in a bit of a fantasy world at the moment where people say there's no mobile phones allowed, when in fact everyone has a mobile phone in their pocket"* (Participant 2).

A participant indicated another influence on practice was previous breaches of patient confidentiality or privacy, which motivated organisations to limit access to mobile technology:

> *"I think it will be when - we've had - the reason it's come about unfortunately, is because of the opposite reason, in that people's photos have got out onto Facebook and to general internet public forums and there's been people that have been sued"* (Participant 4).

Cyberloafing behaviour was also cited as a reason for preventing legitimate access to mobile technology while at work. One representative expressed:

> *"And I don't know whether it's a different generation or different - that people think that they might be checking Facebook or they might be misusing their mobile devices rather than using them for education"* (Participant 4).

Participants also offered potential workarounds to resolve the current impasse regarding legitimate use of mobile technology at point of care, indicating they believed nurses were capable of discerning when mobile learning could be deployed:

> *"We're good at coming up with solutions to things. And I think that's part of our learning"* (Participant 6).

One participant summed up the current situation related to guidance of mobile learning at point of care within Australian healthcare environments by stating:

> *"So it is a real messy minefield"* (Participant 2).

Interviewees raised the importance of appropriate use of mobile technology for informal learning and CPD. This addresses the concept of digital professionalism, which embodies ethical use and maintenance of professional boundaries when using mobile technology within healthcare environments. One participant suggested learning about safe and appropriate use was a risk management strategy to ameliorate the current circumstances:

> *"But of course that's, again, I don't think – I think that's the risk but I – my philosophy is let's train people, let's have a policy, let's train people in safe, responsible mobile use"* (Participant 2).

Additionally, another participant pointed out nurses need to know their professional boundaries regarding seeking and retrieving information, and users also must be able to critically reason when it is appropriate to use mobile technology for learning:

> *"But as I said, nurses need to learn what they need to learn when they need to learn it. This can augment that process but again we're not going to learn how to do open heart surgery just because we've got a new device that's got it there for us. We still have to have appropriate use"* (Participant 6).

Within the theme of risk management, it became apparent that nurse representatives belonging to nursing profession organisations acknowledged there was an issue in the workplace. However, due to the volunteer nature or absence of priority to enable informal learning of CPD at point of care within these organisations, there was a lack of agency to drive change, to enable mobile learning to become a legitimate nursing function. A representative indicated:

> *"I think that we could – and we're doing it at the moment, slowly, as you know, these volunteer organisations and colleges are slow-moving ships but we are trying to develop a policy, not so much about – it probably won't be specific about mobile learning"* (Participant 2).

Interviewees indicated from their comments that despite the lack of congruency about mobile technology use at point of care, they did not view themselves as responsible for solving the current paradox. Representatives discussed the issue as though it was outside the aim and scope of their professional organisation to effect change. There was no acknowledgement of the capacity of their organisations to advocate for a change in the *status quo* or to show leadership in the National arena relating to accessing mobile learning even though it could potentially benefit their members and patients. One participant stated:

> *"But we specifically don't have a position statement on it, it's just something that we recognise is a minimum standard that it must be"* (Participant 5).

Participants had their own opinions about what they as individuals did to could contribute to enabling access and use of mobile technology. However, there was no discussion regarding how their nursing profession organisation could lobby to promote mobile learning for informal learning or CPD.

Stakeholder perceptions

From the comments by representatives of nursing profession organisations it was clear that non-use of mobile learning in nursing healthcare environments is commonplace. Statements by interviewees indicated that healthcare lags behind other industries in harnessing emerging technology and nursing is hindered by groups, within and external to the profession. Representatives provided a range of examples where other stakeholders including the medical profession were using mobile technology. For example, one participant indicated junior medical officers (JMOs) could access mobile learning at point of care:

> *"Well yeah, it certainly seems to be that it's - I see certainly - I guess, I'm getting a little bit older - see a lot new, younger - you know, the JMOs and even some of the residents coming though and they use their phones constantly and it doesn't seem to be seen as an issue"* (Participant 5).

Participants indicated there was a need to address how patients perceive mobile learning by nurses if mobile technology is to be used at point of care. A participant indicated they perceived patients were unaccepting of nurses using mobile technology:

> *"Because I think that there is perhaps a perception and as I said particularly from older people out there that we're using phones merely to communicate with our friends as opposed to actually looking up things that are useful for the conversation at hand"* (Participant 3).

Another representative commented they believed patients would be accepting if the purpose of using the technology was explained:

> *"However, from a patient's perspective, also from the perspective on a personal level, if you use it with them and you explain what you're doing they'll often be quite accepting of that*" (Participant 4).

Additionally, interviewees also indicated there was fear by nurses of reputational damage, if they were accused of misuse by other stakeholders. This risk influenced whether nurses accessed mobile technology at point of care. One representative indicated:

> *"I think they've felt - well, there's been complaints from a patient perspective that nurses seem to be on their phones, using their phones. They see it as patient perception, that nurses in particular aren't working, they're using their mobile devices for personal use in the workplace rather than using it for work purposes"* (Participant 4).

Participants indicated generational cohorts of patients and co-workers behaved differently and this behaviour needed to be taken into account when using mobile technology for learning:

> *"But we've got - it's perception from a different generation that doesn't see it the same way necessarily, so there needs to be education around 'this is what's happening with these mobile devices' as well. Whereas, I certainly see the younger generations now - so, gen Y will often use online learning. So, not necessarily mobile technology as such but they will use Internet learning far more readily"* (Participant 4).

Furthermore, representatives indicated that access to mobile technology varied depending on the role of the nurse. One interviewee stated:

> *"But the nurses, just generalist nurses, certainly aren't able to use their - or are discouraged from having their phones on them when they're with patients"* (Participant 4).

Participants also indicated they believed historical circumstances contributed to the current situation where the nursing profession trails other health professions in using mobile learning. For example, one representative stated:

> *"And I think that while there might be a little bit of a backlash from people who are yearning for a bygone time, the reality going forward is that this reflects well on nursing, showing that nursing is very professional, that they are engaging in and embracing technology"* (Participant 6).

Connectivity

Connectivity was viewed by interviewees as crucial for enabling informal learning and CPD at point of care. Representatives indicated they believed it was detrimental to the work of nurses to block access to information transfer for the purpose of connecting with others, or for seeking and retrieving information via the Internet. Nurses needed to demonstrate they were professional, capable and contemporary in their role as one participant stated:

> *"If in the aviation industry, if our bookings were done by paper we'd be going "what's going on here?". People are expecting, there's a lot of money and high risk, they're expecting that people have access to the latest information, that it's integrated, that they're at the cutting edge. They're not wanting people who are going to the library to borrow a book to see how to attend to your wound. I mean that would be terrifying. I would prefer and I think most people prefer, to have a nurse turn up with a digital device or something to be accessing information, than to be walking up with an old textbook"* (Participant 6).

Statements by participants indicated Internet connectivity to undertake their clinical role was hidden. For example one participant provided an explanation about why they perceived nurses were unable to harness mobile learning at point of care:

> *"I wonder whether nurses tend to be seen as giving that hands on physical care, so they can't pull their phone out and use it, whereas doctors if they're consulting and so it's all right for them to be looking at their phone and that they're being seen to use it for work purposes"* (Participant 4).

The inability of nurses to promote their knowledge and skills hinders their access to this vital resource in the new learning age. Nurses are viewed as caring and compassionate and their high level of clinical skills that can be augmented by knowledge management through connection to the Internet, is less overt. As stated by one participant the need for access to mobile learning tools and resources to improve patient outcomes is invisible.

> *"Anyway, it's actually detrimental because it's a really useful tool, these mobile devices, for our staff"* (Participant 2).

Timing

Interviewees were enthusiastic about the potential of mobile learning at point of care from the perspective that information was available in real-time. One participant stated:

> *"I mean, I've worked in nursing for a hell of a long time and I think I would have given my left arm for that type of ability to look things up then and there at the time"* (Participant 3).

Participants recognised the convenience of being able to access information as required without leaving the patient. One representative reported:

> *"Because we're busy working. We haven't got time to be always stopping to do things. We're busy. And the modern life is busy. And I actually think that nurses find out what they need to know when they need to know it"* (Participant 6).

Similarly, another representative revealed the belief that slow acceptance of mobile learning into healthcare environments hindered the advance of nursing practice:

> *"And in health, I think technology generally in health is really underutilised and I think that we could become far more efficient with education and in improved patient care by using it more appropriately"* (Participant 4).

Comments about the inability to harness mobile learning at point of care indicated that stakeholders were missing vital information and interactions that could improve patient outcomes. One example demonstrates the broad scope of mobile learning for clinicians in practice:

> *"Whereas we are looking up, we should be looking up blood results and then checking it on an app on your phone and finding out what that could be and looking at with your patient symptoms would be fantastic if nurses were doing that and I think would save a huge amount of patient deterioration and improve care"* (Participant 4).

Additionally, participants recognised the benefits for nursing students of being able to learn in real-time:

> *"So it is really that point at which they know that it's going to be significant for them [students] and if they were to like make a note for themselves like we used to do when we were on clinical placement to go and look it up at home. Well sometimes you don't get there, don't do it for one reason or another you forget"* (Participant 3).

Interviewees also realised that over time learning in real-time at point of care will become more commonplace:

> *"Yes I think so. You've got to move with the times. I realise that, over the next decade or so, we've got an older patient group but my mother's downloaded recipes off the internet. I think that's an excuse. I think we have to move. It's in the banking industry. Every other industry That's just part of society. I don't think it's any different in nursing. I think though that nurses in the public image are a little bit caught in time, in a bit of a time capsule. And we're not allowed to grow up"* (Participant 6).

Participants also recognised that access to learning in real-time will take leadership and concerted effort by stakeholders:

> *"But I think there's still a lot of work to be done in being able to do it, I don't think there's a magic bullet that will make it happen but rather a sort of concerted effort over a period of time"* (Participant 5).

One representative summed up the future of mobile learning by stating:

> *"Easily accessible up to date information on the device in your hand at the time you're standing by the patient"* (Participant 1).

Nexus of key themes and learning

Developing protocols that address the four identified themes of risk management, stakeholder perceptions, connectivity and timing is required if learning at point of care is to become a legitimate nursing function. Through their accounts, interviewees described the current mobile learning paradox that exists in Australian healthcare settings:

> *"So, they do say you can't have your device on you and at the same time they say that you should be using your device for - you know, there's all these great things available to you to help your learning and to look up information"* (Participant 4).

Undertaking informal learning and CPD whilst at the workplace is fraught. One participant indicated the duplicity of the current situation by stating:

> *"So to me it's just a technology. It's not actually any different to if you had a textbook or if you had something else, really in that sense"* (Participant 6).

Representatives also could empathise with the patient perspective and described how mobile learning could be used to develop a mutuality of understanding. Rapport development and knowledge transfer can occur when both the nurse and the patient can seek and retrieve information together in real-time. There are potential benefits for enabling patient-centred care when both nurses and patients are able to work together. One representative described how their patients could benefit from mobile learning at point of care:

> *"I think there is definitely potential that patients could perceive nurses were being disinterested, unless the nurse turns around and says, you know what, I'm not sure about this, can I just quickly double check. But then sometimes patients would go, particularly in our specialty in …, the patients generally know a hell of a lot more about their condition than some of the nurses, especially for some of the more rarer conditions and the patients sometimes are the best source of information"* (Participant 5).

Additionally, another participant described the benefits of mobile learning for promoting student learning and their own CPD:

> *"Absolutely and look, you know, part of it is that the students need to learn that things do change and that's one of the reasons why I like it so much is because it keeps me up to date. So yeah, we'll get there"* (Participant 3).

Although representatives realised the potential of learning at point of care they also understood the incongruence of the CPD resources available. Participants discussed the online resources being developed within their specialty organisations and the commitment to online learning for CPD. They provided a range of examples where nurses could access information in real-time or complete more comprehensive modules using mobile learning. They indicated the belief that information was being transformed for use in real-time as learning resources for informal learning and CPD. However, interviewees also raised concerns about mandatory CPD required for annual registration being conducted online, around patient care activities, could be undertaken as 'click through' activities. The quality of learning when undertaking CPD at work was raised by one participant who commented:

> *"But if they're just expected to fit it on around everything else I'm not sure how much focus they'll give it the time, like will they have the machine on, zipping through something and doing something else at the same time"* (Participant 1).

While another participant viewed informal mobile learning at the workplace as beneficial:

> *"Where I think in reality, a lot of the professional development does happen and we want it to happen sort of in real-time. As you know, as needed that's the most cost‑effective and beneficial means is that, you know, quickly have access to something, find out usefully in, you know, in the right time, the right knowledge at the right time, you know, when you need it"* (Participant 2).

Discussion

The emergent themes of risk management, stakeholder perceptions, connectivity and timing in this research confirm the Fixsen and colleagues (2005) framework that the implementation of mobile learning is stalled at the level of adoption in the Stages of Implementation framework (Figure 11). These themes support the contention that nurses within nursing profession organisations are currently unwilling to lead the introduction of mobile learning at a systems level. This reluctance to advance access and use of mobile technology for learning within healthcare environments at a national level then flows to organisation and individual levels. The absence of clear direction within the Registered Nurse Standards for Practice (Nursing and Midwifery Board of Australia 2016c) and new draft Codes of Professional Standards (Nursing and Midwifery Board of Australia 2017) both illustrates the issue and compounds the problem. The absence of agency by nurses within and outside the nursing profession to reform the current situation as detailed in this study perpetuates the mobile learning paradox.

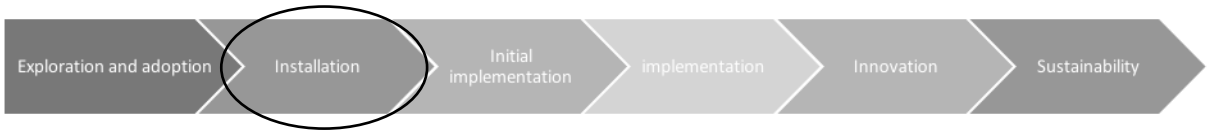

Figure 11. Stages of implementation (Modified from Fixsen et al 2005)

Addressing the four themes is necessary to enable mobile learning at point of care. As long as limitations synonymous with these themes persist, nurses will be hindered in their ability to access mobile learning for informal learning and CPD. Additionally, nurses cannot support, guide or model digital professionalism to nursing students undertaking work integrated learning if they are unable to access mobile technology for learning. Unwillingness of senior nurses to act as agents of change to harness mobile learning for the profession, is cause for concern, as their agency is required to overcome the stalled implementation of mobile learning at point of care (Fixsen et al. 2005; Mather & Cummings 2016).

The release of Australia's National Digital Health Strategy (Australian Government 2017a) and current review of Registered Nurse Accreditation Standards (Australian Nursing and Midwifery Accreditation Council 2017) has created opportunities to remedy the current situation. Strategy 6 of the Digital Health Strategy acknowledges that Australia requires a health workforce that can confidently use digital health technologies to deliver health and care (Australian Government 2017a). Support for change management, training, resources and clear direction are outlined within this plan. Additionally, the Australian Nursing and Midwifery Accreditation Council Consultation Paper 1 provides opportunity to feed forward information about supporting informatics and mobile learning within the undergraduate nursing curriculum as part of the best practice clinical learning environments framework (Australian Nursing and Midwifery Accreditation Council 2017).

Nurses are bound by National Standards and Codes which provided detailed cues about expected knowledge, skills, attitudes and behaviour of nurses. The new Registered Nurse Standards for Practice (Nursing and Midwifery Board of Australia 2016c) and revised Codes (Nursing and Midwifery Board of Australia 2017) are more generic, enabling organisations and individuals new autonomy to determine expectations of the practice of being a nurse (Mather, Gale & Cummings 2017). However, the lack of explicit direction or expression regarding mobile technology in these documents may perpetuate the lack of support for its use in healthcare environments, because nurses are not yet conversant with the new Standards and Codes, nor the level of autonomy provided by them (Mackay, Anderson & Harding 2017). Participants believed they were not in appropriate nursing roles to enable change at the workplace and expressed little enthusiasm in being involved in the change process.

Participants did not view advocacy through their nursing profession organisation for mobile learning at a systems or organisation level was part of their role. Those representatives who recognised there was an opportunity to integrate mobile technology for learning to develop their advanced practice

specialty identified that change within professional organisations was slow, because it often relied on volunteer labour. Members volunteer their time, which is insufficient to maintain momentum for promoting the aims of the nursing profession organisation. Burnout was found to be an issue for volunteers, and so progressing the aims and objectives of the nursing profession organisation was often inconsistent. The irregular participation of nurses within volunteer nursing specialty organisations contributed to low recruitment of interviewees in this study. The main focus of specialty organisations is advancing specific clinical information of the speciality group. It is not advocating for developing platforms to convey the information nurses are trying to promote. Often nurses who hold executive positions within nursing profession organisations do not provide direct care. So, they do not have contemporary experience of the importance of how information can now be integrated into nursing practice and transferred at point of care within healthcare environments.

There is a lack of homogeneity among the nursing profession regarding the use of mobile technology. Resistance to changing workflows (Westbrook et al. 2011) owing to inadequate educational preparation and fear of inappropriate use of mobile technology was reported (Green 2017; Mather & Cummings 2016). Representatives provided examples where inappropriate behaviour resulted in 'banning' of mobile technology at the workplace. They used anecdotal reports of unprofessional behaviour as a justification for non-use. Direct care nurses were unable to access mobile technology, whereas nurses in other roles were allowed to carry a mobile device. This incongruency of access to mobile technology will perpetuate the confusion between leisure and learning that could be ameliorated by allowing mobile learning to become a legitimate nursing function (Alt 2016). Further innovation in mobile technology is predicted (Risling 2017; Roberts & Williams 2017) and will contribute to expanding the current mobile learning gap already present in healthcare environments if the *status quo* remains unchallenged.

Anecdotal evidence of previous inappropriate behaviour of health professionals (Green 2017; White et al. 2013) has shaped the current situation whereby nurses at point of care are hindered by the inability to access mobile learning. Nursing representatives indicated the absence of clear policy direction within organisations has resulted in non-access to mobile technology for learning that overtime has been eroded by some health professions (Mansfield et al. 2011), whereas nurses have not challenged the *status quo*. Nurses were ineligible to undertake mobile learning, however, other health professionals were able to use mobile technology at point of care. Interviewees provided justification about the inequity of access by rationalising adverse media attention was responsible (Green 2017; Jones & Hayter 2013; Wilson et al. 2014) for 'banning' of mobile technology at the workplace. Participants mentioned cyberloafing and unprofessional behaviour such as using social media while at the workplace also contributed to the inability to use mobile technology (Lim & Chen 2012; McBride, LeVasseur & Li 2015). All representatives promulgated narratives of inappropriate behaviour by nurses, admitting they had not witnessed it themselves, resulting in the passive acceptance of non-use of mobile technology for learning was of concern.

Access to learning resources within healthcare environments is imperative. Currently the need to seek and retrieve information in real-time by nurses is hidden. The lack of agency of nurses to promote their knowledge and skills hinders their access to this vital activity in the new learning age. Nurses are viewed by the public as caring and compassionate individuals, their advanced critical thinking and capacity for managing complex nursing care is less overt (Buresh & Gordon 2006). Therefore, clinical skill enhancement by accessing information in real-time is seen as less valuable by organisations and nurses who are not educationally prepared for using mobile learning at point of care.

Installation of mobile learning to enable access to information and learning resources to improve patient outcomes is overdue. However, through their commentary, nurse leaders appeared to absolve themselves of responsibility for advocating a method to contemporise seeking and retrieving of information within the profession to advance nursing practice. Nurses uphold the historical hierarchical system whereby they lack inclusion in decision-making and are unable to articulate the importance of mobile learning for enabling informal learning and CPD (Buresh & Gordon 2006). This apparent inability to communicate the value of access to mobile technology hinders nurses demonstrating how mobile learning can improve workflow, promote continuity of care and potentially improve patient outcomes. Additionally, the continued inability of nurses to model digital

professionalism to undergraduate nurses will perpetuate the *status quo*. The current deficiency in capacity of nurses to influence the direction of mobile learning policy at systems and organisations levels further marginalises this profession within the registered health professions. The ineffectiveness of representation of nursing interests at National level will perpetuate and extend over time the inequity of access to mobile technology for learning that is emerging among the registered health professions (Australian Government 2017c; Mather, Gale & Cummings 2017).

The casualties of this failure to embrace the mobile learning era are stakeholders. The absence of agency to promote mobile learning at point of care is a lost opportunity by nurses to lead learning in real-time at the workplace. Being able to legitimately access information at the bedside has the potential to build capacity with stakeholders including other health professionals, students and patients (Horstmanshof & Moore 2016). Moreover, accessing mobile technology at point of care could strengthen the nurse-patient relationship by increasing mutuality of understanding (Mather & Cummings 2015), enable continuity of care and reduce time away from the patient. Nurse supervisors could capitalise on real-time learning moments by supporting students at point of care by using mobile learning when it is safe and appropriate to do so. Currently, nurses support students in practice because they believe 'it is the right thing to do' (Mackay, Anderson & Harding 2017). However, although they understand the risks, challenges and benefits, they do not advocate for access to mobile learning to support this activity. This unwillingness to lobby for access to learning resources demonstrates an absence of agency by nurses to contemporise their nursing practice by maximising opportunities for informal learning and CPD (Moorley & Chinn 2015) and teaching students undertaking work integrated learning.

Nurses are highly skilled clinicians constantly analysing and altering their planned schedule of care as new information or events require reprioritisation of activities (Westbrook et al. 2011). The constant interruptions to established workflows demonstrates critical thinking and an ability of individuals working at point of care to be flexible. As interruptions to workflow increase, the fragmentation of nursing care creates the potential for the development of workarounds. Nurses modify the way they think and behave when nursing practices no longer work as intended, become redundant or there are opportunities to incorporate new work practices that benefit workflow. This adaptation process includes recognising the advantage incorporating the intervention, and accepting and investing in learning about the new process to enable integration into routine work patterns. Sustaining change occurs when the benefits outweigh non-use (May, Sibley & Hunt 2014). Although mobile learning has been embraced by Australian nurse supervisors, and students indicate it is a useful adjunct to traditional learning methods, the inability to access mobile technology for learning persists.

Inclusion of mobile learning early in the nursing curriculum in the classroom will enable modelling of digital professionalism prior to undertaking work integrated learning (Cummings et al. 2016). Congruence of learning on campus and being able to continue to use mobile technology during work integrated learning will promote safe and appropriate use by the next generation of nurses. The ADHA Digital Health Strategy (2017a) acknowledges the need for preparation of the nursing health workforce to become digitally literate. As the nursing workforce is the largest of the registered health professions it is imperative that resources are channelled to upskill the current workforce, so they can guide and support students in digital professionalism while in practice (Duke et al. 2017). It is imperative that nursing profession organisations recognise knowledge management relies on connectivity. It is within their realm to gain influence at a systems level, so they can advocate for appropriate governance of mobile learning at point of care for the benefit of all stakeholders. Only when there is equity of access to mobile technology can nurses fully participate in informal learning, CPD, and guidance of nursing students in digital professionalism, will nurses be able to deliver contemporary nursing practice in real-time.

Impact statement

Lack of governance guiding the use of mobile technology at point of care at a systems level negatively impacts the ability of nurses to legitimately incorporate mobile learning into their nursing practice. The current 'mobile learning paradox' needs to be resolved from within the profession of nursing and healthcare organisations.

Limitations

Limitations of this study include timing of interviews, which due to the short recruitment period took place during December 2016 – January 2017. Recruitment in the lead up to the Christmas period may have reduced opportunity as potential participants may have organised annual leave during the Australian summer, were required to complete work by the end of the year or work during the traditional holiday shut-down period may not have responded, whereas they have done so if recruitment occurred during another time period. Recruitment ceased when the Health Informatics Society of Australia, Nursing Informatics Australia and Australian College of Nursing released the joint draft positon statement on nursing informatics in February 2017, as this could have changed perspectives of future interviewees by raising awareness of the topic.

Strengths

Although recruitment numbers were low, participants were senior nurses, who during their careers had experienced clinical, administration, education and research within the nursing profession. This wealth of knowledge was demonstrated through interview. Timing of the interviews was a limitation, and also a strength. This study was undertaken before the draft position statement on nursing informatics was released, providing baseline understanding of the field that can provide direction for further research.

Future directions

The nursing profession is the largest of the registered health profession. As such, this profession is in a strong position to lead mobile learning at point of care. However, this ascendancy will only be accomplished when nurses marshal their mobile learning agency by taking responsibility for leadership within healthcare environments.

There is an opportunity to achieve this aim by embracing the ADHA National Digital Health Strategy (2017b) and demanding the profession of nursing is included in decision-making at a systems and organisation level. Involving nurses in systems design and creating positive and supportive environments is instrumental to sustainability of the health workforce (Huryk 2010). Further research into safe and appropriate use of mobile learning by trialling its use needs investigation. The inclusion of digital professionalism early within the undergraduate nursing curriculum is necessary, as is the educational preparation of undergraduate nurses and nurses currently employed within healthcare settings. It is imperative that nurses develop requisite skills to seamlessly undertake patient care and to guide and support students in using mobile technology for learning at point of care.

Further research into mobile learning at point of care is necessary to ensure standards, guidelines and codes of conduct reflect safe and appropriate use. Usability trials to evaluate quality and safety issues may assist with providing evidence to guide risk management for implementation of mobile learning at point of care. This research will also provide rich data to guide undergraduate nursing curriculum development. Gaining the patient perspective regarding nurses using mobile learning will be beneficial to all stakeholders. Findings can be used to guide patient education about the implementation of mobile learning and be used to guide deployment of mobile learning in health care environments.

Conclusions

There is a gap in the governance of mobile technology for learning by nursing profession organisations. At systems and organisation levels, there is a lack of leadership providing direction for the professional conduct of nurses, which is expressed as the inability for nurses to implement mobile technology for learning as a legitimate nursing function. This shortage of support stalls the capacity for individual nurses to implement and model digital professionalism at point of care. Additionally, there is a deficiency of agency within the nursing profession and healthcare organisations that further hinders the installation or deployment of mobile learning at an individual level within healthcare environments.

Through their narratives participants indicated an absence of governance within nursing organisations is perpetuated by a lack of inclusion in decision-making at a systems level. Currently, there is insufficient agency by nurses in leadership positions to influence the installation of mobile technology for informal learning and CPD at point of care in healthcare environments. However, inclusion of nurses in healthcare decision-making at a systems level coupled with promoting digital professionalism within organisations and higher education institutions will foster a more inclusive culture that will benefit inter-professional relations and contribute to improving patient outcomes.

The installation of digital technology for mobile learning to enable informal learning and CPD to be undertaken at point of care challenges traditional work patterns. There is a lack of leadership by nurses within professional organisations to advance governance of digital professionalism that needs to be ameliorated. Empowerment of members within nursing profession organisations will support mobile learning to become a legitimate nursing function.

9.3 Commentary on Chapter 9

This chapter reports how nursing profession organisations have influenced or impacted mobile learning at point of care. The research showed there is a lack of agency by nurses to promote mobile learning at point of care. The invisibility of overt direction contributes to nurse leaders within organisations being unaware of the benefits of mobile learning at point of care. This group of senior nurses may no longer deliver healthcare at point of care and may not realise the impact of lack of access on learning and teaching, informal learning and CPD. Additionally, understanding the potential benefits of being able to seek and retrieve information in real-time at point of care may not be realised by this group of nurses. If governance at a National level included clear direction regarding the use of mobile technology for learning this may assist with legitimising the use of mobile learning at point of care. This chapter contributes to answering the research question by demonstrating the lack of governance at a systems level impacts the organisation level and contributes to answering research question 2:

> *RQ2: What is the impact of current governance structures on mobile learning in situ, at point of care?*

The research presented in this chapter contributed to answering research question 2 through research objective 2:

> *RQ2 RO2: What is the organisation impact on governance of mobile learning at point of care?*

Using interpretive description, the impact of these organisations on mobile learning policy development was explored. All five steps of a pragmatic lens of enquiry were utilised within this study. The fifth step of ‘responding to the problem’, through future directions section suggests strategies that can alter the current situation and promote mobile learning for informal learning and CPD at point of care as a legitimate nursing function.

Chapter 10 Synthesis of the research domain

Facilius enim per partes in cognitionem totius adducimur

We are more easily led part by part to an understanding of the whole

(Lucius Annaeus Seneca the Younger)

The pragmatic approach seeks evaluation of potential consequences of the problem. This approach also seeks a response by providing potential solutions to the issue of research. Triangulation of the data of this research presents the complexity of the issue of mobile learning for nurses at point of care. An evaluation of a synthesis of the domain shows there is a need for cultural change at individual, organisation and systems levels to enable this adjunct learning method to be accessible by nurses within healthcare environments. Each study contributes insights into the professional identity of nurses and the combined findings show that nurses are yet to develop agency to grasp the leadership necessary to drive change that has the potential to improve patient outcomes. The embedded culture demonstrates nurses understand the benefits of mobile learning; however, they continue to lack the capacity to effect change. Lack of governance regarding the safe and appropriate use of mobile technology for informal learning and CPD at point of care compounds this issue. Hindrance of installation of mobile learning by nurses will continue unless nurses are included in decision-making about enabling the use of mobile technology at systems and organisation levels. This chapter is divided into five sections:

- Section 10.1 provides an introduction to article 13, which synthesises the research and demonstrates the complexity of installing mobile learning as a legitimate nursing function;
- Section 10.2 presents article 13 - *Mobile Learning in Nursing: Tales from the Profession*;
- Section 10.3 provides commentary on Chapter 10 and its contribution to answering both research questions and objectives;
- Section 10.4 provides an assessment and reflection on answering the research questions in Phase 2; and
- Section 10.5 provides the conclusions of this dissertation. The conclusions include contributions of the research, limitations, strengths, directions for further research and reflections on this research study.

10.1 Introduction to article 13

The lack of governance at all levels has created opportunity for the development of a raft of impediments that have been identified through this research. This complex of factors has created a situation whereby mobile learning at point of care is limited in Australian healthcare environments. The research has shown these factors infiltrate nursing practice at all levels and continue to hinder mobile learning becoming a legitimate nursing function. While the use of mobile or portable devices remains an un-sanctioned activity there is opportunity for misuse that could be minimised if nurse supervisors were able to model safe and appropriate behaviour at the workplace. If digital professionalism was taught as part of professional identity formation undergraduate nurses could be prepared to behave safely and appropriately during work integrated learning. However, while mobile learning continues to be covert, and there is a lack of guidance at the workplace, there is opportunity for inappropriate behaviour by the actors.

10.2 Article 13 - Mobile Learning in Nursing: Tales from the Profession

This article is currently under review for inclusion in the *Studies in Health Technology and Informatics* series as:

Mather, CA and Cummings, EA and Gale, F. Mobile Learning in Nursing: Tales from the Profession.

Abstract

During the last five years, research about mobile learning conducted with nurses, nurse supervisors and undergraduate students has provided insight into the complexity of this emerging issue, which has the potential to positively impact the workflow of nursing care and improve patient outcomes. Survey and focus group studies including confirmation of beliefs of nurses and nurse supervisors and interviews with representatives from nursing profession organisations were undertaken. Nursing student perspectives about mobile learning were also explored through an online survey. This paper draws on participant narratives from this research revealing 'tales from the profession', to demonstrate the complexity of installing mobile technology for learning at point of care for the benefit of healthcare professionals and their patients. This research demonstrates the urgency for introducing governance to provide guidance regarding safe and appropriate use of mobile learning at point of care. Teaching digital professionalism early in undergraduate nursing curricula and promotion of modelling digitally professional behaviour by nurses within healthcare environments is also imperative.

Key words: Digital professionalism, mobile learning, mobile technology, nursing, point of care, social media, workflow.

Introduction

How long can healthcare professionals ignore the opportunity to advance nursing practice through real-time learning at point of care? This vexing question about accessibility and use of mobile technology at the bedside demands an answer. Nurses are highly flexible and pragmatic in responding to situations, finding workarounds for nursing practices that do not work as intended, become redundant or are viewed as onerous (Elgin & Bergero 2015). This cognitive and behavioural capability leads nurses to reconfigure and normalise new practices into nursing work when the benefits outweigh non-use (Mather & Cummings 2017). Historically, nurses have embraced the use of mobile technology in healthcare environments. However, as 'tales from the profession' emerged, the deployment of mobile technology to enhance learning opportunities at point of care stalled (Mather & Cummings 2017).

Use of mobile technology for learning has disrupted traditional workflow patterns. The advent of real-time access to information has led to a range of systems and organisational responses that initially included the prohibition mobile technology's use at the workplace and at point of care (Ferguson 2013). However, some healthcare organisations now ignore mobile technology use by specific health profession groups at the workplace (Mansfield et al. 2011). Other groups, including nurses, believe they are still precluded from the benefits of legitimate mobile technology use (Ferguson 2013).

The absence of governance protocols relating to mobile technology use at a National and organisational level in Australian healthcare environments has generated confusion between its use for leisure and learning (Mather, Gale & Cummings 2017). This lack of direction about when and how to deploy mobile technology in healthcare settings has historically blurred boundaries for health professionals, created adverse media attention, and negatively impacted the capability to incorporate new technology into workflows (Green 2017). Recent investigation by the authors of the reasons for slow acceptance of mobile technology from nursing professionals and students highlights an absence of capability and capacity to use mobile technology for learning at point of care. Drawing on a series of narratives from original research, this paper uncovers the additional complexity as expressed from within the domain of nursing regarding the installation of mobile learning at point of care.

Method

Over the past five years, the authors have researched the barriers, risks, challenges and benefits of mobile learning at point of care in two Australian States. Nurses and nurse supervisors participated in surveys and focus groups. Undergraduate nurses participated in online surveys. Individual interviews were undertaken with representatives from nursing profession organisations. The aim was to understand the mobile learning paradox of easy, timely, and convenient access to health information being more available away from the workplace, rather than when at work (Mather & Cummings 2015, 2016; Mather, Cummings & Allen 2013). University Ethics Committee approval was gained prior to the commencement of the studies (H0013729, H0016097).

Results

In Australia, nurses and undergraduate students, through a range of attitudes and behaviours at systems, organisational and individual levels, are generally actively dissuaded from using mobile technology in the workplace. The following sections provide narrative excerpts from these studies demonstrating participant beliefs relating to mobile technology use for mobile learning.

Nurse supervisors

Through recorded and transcribed focus groups, the extent of the inability to access and use mobile technology was explored (H0013729). Nurse supervisors reported that due to organisational policy they were precluded access to digital resources to assist with guidance and mentoring of undergraduate students undertaking work integrated learning, while at the workplace (Mather, Marlow & Cummings 2013). Some participants demonstrated firm beliefs about the use of mobile technology and it became evident nurses are negatively enculturated about using mobile learning at point of care. As one nurse supervisor explained:

> *"Well, I don't use it when I'm at my workplace, we're not allowed to use it supposedly. We're supposed to have it away and not be in sight at all. Yet the doctors around have their mobiles and use them all the time, although sometimes I think if you were taking it out again to look up drug calculations and things like that but generally it's not supposed to be in sight. We did have a lot of people who were using it for the wrong reason. I think that sort of scarred and marked everyone down. So we haven't been able to use it"* (Focus Group 1).

Participants used human factor examples to rationalise why nurses and students were not sanctioned to use mobile technology for learning at the workplace. For example:

> *"I can see a student could be sitting there if they've got free time to look over their assignment or look up stuff. I think it would be okay for them to be looking up something relevant to what they're doing. No, not on Facebook but if doing something relevant and doing an assignment or just looking up something that's related to what they're practicing then I think it's fine"* (Focus Group 5).

Another participant indicated that learning in real-time was useful, however doubt about trust continued to be evident:

> *"They can give that patient really good education re that medication they're on or whatever discharge, information going home, whatever, they can be up to date. I can see that side as being a really good thing as well. But I can see them sitting in the office and sometimes not doing what they're supposed to be doing"* (Focus Group 2).

Nurse supervisors understood the importance of students developing digital professionalism while learning in real-time at point of care. One respondent, acknowledging that students mimic the behaviour of their mentors including situations where mobile technology was used for mobile learning, stated:

> *"[T]he other side to that is that, if we're modelling what we want them to do as RNs [registered nurses], then them having the capacity to be able to show and discern [that] is probably important as well"* (Focus Group 2).

The findings of the original focus group study were presented to a workshop of nurse supervisors who were involved in the first study. This group confirmed professionalism, accessibility (physical environment) and human factors were the highest priorities (Mather & Cummings 2017). It also became evident that the concept of modelling digitally professional behaviour was emerging for nurses working in healthcare environments.

Student nurses

The publication of the Australian Nursing and Midwifery Accreditation Council explanatory note regarding embedding health technology into undergraduate nursing programmes (Australian Nursing and Midwifery Accreditation Council 2014) provided further impetus to ensure students were educationally prepared to use mobile technology for learning prior to undertaking work integrated learning as part of their studies. To understand their perspective, undergraduate nurses were surveyed about their current and preferred use of mobile technology during and away from nursing practice. The online questionnaire included three free-text questions (H0013729) and provided opportunity for respondents to give further feedback about the barriers and benefits of using mobile technology. Similar to nurse supervisors, students provided a range of human factors that hindered access to mobile technology:

> *"Patients and their families could think that we are busy talking to our friends or doing something that is not related to caring patients. Also, nurses and doctors can waste their time even though they try to use mobile phones for right purpose (i.e., Facebook, Twitter)".*

Comments demonstrated students understood their decrement of mobile technology while undertaking work integrated learning (Mather Cummings & Allen 2013). One student stated:

> *"Some might use it for personal reason and get preceptors off side which would be a disadvantage for people that are using them correctly".*

The historical failure to clarify the boundaries of digital professionalism is a legacy that continues to hinder access to mobile learning at point of care by student nurses.

Nursing profession organisations

Interviews of representatives from six nursing professional organisations provided further information about the lack of mobile learning at point of care (H0016097). Participants referred to the circumstances they had experienced as clinicians or educators, highlighting how technology is dynamically transforming the clinical and professional environment of nurses. Responses further demonstrated a lack of nursing influence in how workflows in healthcare environments were managed. One representative stated:

> *I think there has to be some work about letting patients know I'm not on Facebook here, I'm actually you know, searching something, looking up a drug or whatever"* (Participant 2).

The deficit of nurse involvement as a primary stakeholder in shaping the access and use of mobile technology was evident (Australian Government 2017c). This leadership gap, further perpetuated by the nursing professions' inability to provide clear direction within the Standards for Practice (Nursing and Midwifery Board of Australia 2016c) or through the revised Codes of Conduct and Professional Boundaries (Nursing and Midwifery Board of Australia 2017), is cause for concern. The Australian Nursing and Midwifery Accreditation Council is the only National nursing organisation that provides unequivocal statements obliging the mandatory educational preparation of nurses regarding the use of health technology, which does at least demonstrate that nurses recognise the need for the nursing workforce to develop capacity and embrace its presence (Australian Nursing and Midwifery

Accreditation Council 2014). While nurses remain excluded at systems and organisation levels from input into reforms, 'tales from the profession' at point of care, will continue to abound.

Discussion

A lack of supportive governance of mobile technology at a National level shapes organisational culture, individual cognition and behaviour, perpetuating negative attitudes to mobile technology use (Jones & Hayter 2013). The 'tales from the profession' promulgated by nurses, risk perpetuating the slow acceptance of mobile technology at the workplace. The narratives provide evidence that support for access to mobile technology for learning is inadequate. Deficiencies in confidence coupled with an inability to use digital technology and resistance by some nurses perpetuates professional reluctance, which will not be overcome, while mobile technology use remains an unsanctioned activity (Mather, Marlow & Cummings 2013).

Nurses are the largest proportion of the healthcare workforce, and are more visible, have more consistent contact with patients, and their families than any other health profession. The continuance of 'tales from the profession' that promote the misrepresentation of the potential of mobile learning, both supports and enables missed opportunities for improving patient outcomes. During this research, nurses and undergraduate students reported that they believed colleagues and patients disapproved of nurses using mobile technology and that they feared being viewed as untrustworthy or accused of misuse. Respondents reported a desire to avoid the ire of their colleagues despite claiming they understood the boundaries of digital professionalism. Through their narratives, participants acknowledged the existence of a mobile learning paradox by identifying the benefits of the new mobile technologies side by side with their inability to access it (Green 2017). The fear of peer disapproval and/or of breaching local culture or organisational policy was sufficient to inhibit its use. Nurses also perceived a deep inequity in access to mobile learning, providing examples of other health professionals they believed had unfettered use to it to seek and retrieve information (Mansfield et al. 2011).

The Australian National Digital Health Strategy (Australian Government 2017b) states there is a need for a workforce that can confidently use digital health technologies to deliver health and care. Strategic Priority 6 states that trust and confidence in digital technologies needs to be developed. The strategy identifies a need to integrate digital technology into normal workflows by supporting health professionals through supply of digital change champions, on-demand training, promotion of leadership opportunities and innovation within higher education institutions and in healthcare environments (Australian Government 2017c). Successful implementation of this strategy would improve the capability of nurses to combat embedded negative 'tales from the profession' and enable positive cultural change. Current stereotypes of misuse and untrustworthiness from within the profession could be challenged, if digital professionalism was incorporated earlier in undergraduate programmes. Overtime, installation of a standardised approach, supported by appropriate protocols, would enable a re-framing of the current, negative narratives. In the meantime, confusion regarding using mobile technology for leisure and learning and blurring of personal and professional lives will persist (Jones & Hayter 2013). Disruption to workflows created by the inability to access mobile learning will remain until these issues are addressed at a systems, organisational, and individual level (Mather & Cummings 2015).

Conclusion

Learning in real-time at point of care is currently a casualty of governance arrangements that create confusion and cause a perception of double-standards regarding which groups of health professionals are permitted to seek and retrieve information at the bedside. This uncertainty perpetuates complicity in the 'tales from the profession' that nurses tell that have become embedded as nursing folklore. There is a need to embrace the Australian Digital Health Strategy (Australian Government 2017b) to ensure nurses are part of the solution and influence the incorporation of mobile technology into workflows for learning at organisation, national and international levels. Since the protection of relationships within the health professions and with patients is the primary imperative, legitimate

access to mobile technology must only occur within the boundaries of appropriate digitally professional behaviour. Since this is developing and can be specified in protocols, there is a missed opportunity for learning at point of care that is hindering the potential for mobile technology and mobile learning to contribute to improving patient outcomes and enhancing student learning.

10.3 Commentary on Chapter 10

This chapter is a synthesis of the research, contains one article, and the conclusions to the research. The research shows the complexity of the research domain and demonstrates the nature and scope of usability of mobile learning for informal learning and CPD at point of care from a systems, organisation and individual level. Using systems theory, the chapter describes the inextricable links between levels and how these connections contribute to the current situation. This chapter contributes to answering both research questions:

> *RQ1: What factors have contributed to the limited acceptance of mobile learning, using mobile or portable devices, by nurses in healthcare environments?*
>
> *RQ2: What is the impact of current governance structures on mobile learning in situ, at point of care?*

The research shows systems, organisation and individual level factors compound the inertia and lack of acceptance of mobile learning by nurses at point of care, in healthcare settings. The synthesis of the research demonstrates how the current governance structures impact and contribute to the current situation whereby mobile learning at point of care by nurses continues to be restricted. Employing the pragmatic lens follows the five steps of inquiry to enable suggestions for completing this cycle of beliefs and actions, and enables the start of new connections.

10.4 Assessment and reflection on answering the research questions in Phase 2

The pragmatic lens of enquiry supported the Phase 2 research question of understanding the impact of current governance structures on mobile learning in situ at point of care. The two research objectives of this question enabled focus on exploring how mobile learning is governed at a systems level and how organisation governance impacts mobile learning at point of care. Investigation of the nexus of nursing, mobile technology and mobile learning were guided by the research questions and objectives outlined in Table 13.

Table 13. Summary of research questions and objectives answered in Phase 2 of study

Chapter Number	Publication Number	Research question	Research objective
Phase 2			
8	11	2	1
9	12	2	2
10	13	1 2	1 & 2 1 & 2

Phase 2 explored the impact of current Australian governance structures on mobile learning at point of care. Analysis of the governance of nursing at a systems level revealed many of the barriers, risks and challenges identified by registered nurse supervisors and undergraduate students in Phase 1 of the research could be attributed to the lack of clear direction in the current standards, guidelines and codes of conduct for nurses. While the standards do not prohibit the use of mobile technology at point of care, neither is there any direction about its use. This inadequacy means healthcare organisations are vested with the responsibility of deciding whether nurses are able to access mobile technology at the workplace. Nurses within nursing profession organisations are reluctant to act as agents to alter the

mobile learning paradox evident in Australian healthcare environments. Lack of agency by these senior nurses at an organisation level impacts on the capacity of individuals to deploy mobile learning at point of care. Inadequate support at a systems level flows to individuals delivering healthcare within healthcare environments. This failure by nurses to embrace the mobile learning era is a lost opportunity for leading learning and teaching, informal learning and CPD at point of care. Phase 2 of the research demonstrated the complexity of the impact of current governance on the inability of nurses to harness mobile learning for informal learning and CPD at point of care.

10.5 Conclusions

10.5.1 Contributions of the dissertation: Overview

This dissertation has contributed to the literature by demonstrating advancement of nursing practice in Australia is hindered by a complex of factors, which impacts the ability of nurse supervisors and undergraduate nurses at point of care, to utilise mobile technology for informal learning and CPD. Advances in informatics has provided opportunities for nurses to embrace digital technology that can improve workflow, support 'learning moments' to aid in decision-making, reduce errors, and potentially improve patient outcomes. To gain an understanding of the research domain the studies undertaken in this dissertation explored the nature and scope of usability of mobile learning, at point of care by registered nurse supervisors and undergraduate nurses. The purpose of in this dissertation was to understand how mobile technology is used by nurses, for informal learning and CPD in Australian healthcare environments. This knowledge can shape the future of nursing practice by providing evidence to enable nursing leaders to effect change, to allow mobile learning to become a legitimate nursing function.

10.5.2 Contributions of the dissertation: Individual level

Identification that nurse supervisors were precluded from using mobile technology for learning and teaching led to this research being undertaken to explore how this impacted nurses in healthcare environments. There is an inability of nurses to access and use mobile technology for learning at point of care and this restriction impacts current workflows and patient care. More specifically it reduces the capacity of nurses to meet Standard 3 of the Registered Nurse Standards for Practice (Nursing and Midwifery Board of Australia 2016a) of maintaining the capability for practice. The lack of access to learning in real-time at point of care also reduces the capacity of nurses to meet mandated annual continuing nursing education necessary to meet the annual requirements for continuation of registration as a nurse (Nursing and Midwifery Board of Australia 2016b).

Exploration of the nature and scope of usability of mobile learning by registered nurse supervisors and undergraduate nurses revealed there were challenges, risks, benefits and barriers to using mobile technology at point of care. While some of these challenges and risks require further investigation, it was the broad range of barriers found that is cause for concern. Although the potential benefits could outweigh the challenges and risks, currently there is an absence of governance to enable a standardised approach for installation and deployment of mobile technology for learning by nurses. The development and modelling of digital professionalism within nursing as part of professional identity formation will continue to be deficient while governance regarding mobile technology in healthcare environments is lacking.

The absence of direction at an individual level hinders nursing informatics leadership in promoting this adjunct to traditional methods of learning at point of care. The low proportion of nurses included at an executive level within National healthcare organisations and within the healthcare industry also reduces the capacity of nurses to advocate for access to technology that will advance nursing practice. Unless nurses develop the agency required to demand to be included in decision-making that impacts nursing, the mobile learning paradox will remain.

10.5.3 Contributions of the dissertation: Organisation level

Representatives from nursing profession organisations indicated there was a dearth of leadership to promote the use of mobile technology at an organisation level. This research revealed that due to the specific focus of National and specialty nursing organisations that platforms for information transfer were not a priority of these organisations. This finding was a cause for concern because nursing profession organisations rely on digital technology to convey information to their membership. Additionally, many specialty nursing profession organisations have developed digital information for access by mobile technology to promote informal learning in real-time at point of care and CPD opportunities.

This research revealed healthcare organisations have a tendency to lack clear direction on using mobile technology. While most organisations in Australia have social media policies, guidance on the use of mobile technology for learning at point of care is less clear. This research reports that nurses are confused by lack of governance at a systems level that impacts at an organisation level. Local rules or culture often defines which professions within the healthcare workforce are allowed to use mobile technology within organisations. Additionally, the absence of clear direction means access and use of mobile technology is inconsistent across the health professions and within workplaces. The banning of mobile technology access by some sectors of the profession occurs in Australian healthcare environments. The perception of inability to use by some groups within the registered health professions, especially nurses was also revealed.

Undergraduate nurses who are the next generation of nursing health professionals are precluded by the regulations of their tertiary institutions from using mobile technology during work integrated learning. Participants in this study reported there was inconsistent application of the regulations by academics in higher education or healthcare organisations where students undertake work integrated learning. The inconsistency of policy and guidelines has created confusion and potential for inappropriate and unsafe use of mobile technology in healthcare environments. This lack of governance at an organisation level contributes to nursing students being unable to learn digital professionalism as part of their professional identity formation within healthcare settings.

10.5.4 Contributions of the dissertation: Systems level

The lack of governance found at a systems level impacts at an organisation and individual level. The absence of overt direction within the Registered Nurse Standards for Practice (Nursing and Midwifery Board of Australia 2016a), CPD (Nursing and Midwifery Board of Australia 2016b) and revised Codes of Conduct (Nursing and Midwifery Board of Australia 2017) is problematic at an organisation level. The National Standards and Codes for nursing are generic and allow for interpretation within organisations. The lack of agency by nurses to ensure they are able to shape policy by being included in decisions that affect their ability to undertake their role and function effectively and efficiently, has contributed to the inability to access mobile technology, at an individual level, for learning at point of care in Australian healthcare environments.

10.5.5 Scope of the research

The scope of the research included seeking the perspectives of nurse supervisors and undergraduate nurses about using mobile technology for learning at point of care within healthcare environments in two Australian States. Nurse supervisor participants were affiliated with The University of Tasmania as contract employees or volunteer nurse supervisors. Nursing student participants were enrolled in the Bachelor of Nursing at this university. Representatives from nursing profession organisations had no affiliation with the University or the researcher.

10.5.6 Research bias

A mixed methods approach using both survey research and interpretive description was applied in this research. A pragmatic approach was used to underpin the research process. The potential for bias is

inherent in all research, however, it was minimised in these studies through using a number of methods. The ethics committee approvals ensured participants were aware they were volunteers in the research and could withdraw at any time. Each participant received information about the research before consenting to participate. Online survey participants consented when they chose to complete the surveys. Focus group participants completed hard-copy consent forms. Individual interview participant consent was recorded prior to undertaken the telephone interview. Participants were offered the opportunity to ensure their transcripts were accurate reflections of interviews.

The researchers were aware of the potential for research bias and systematically employed methods to reduce the potential for influencing either the quantitative or qualitative data collection. The online *Use of digital technology by clinical facilitators* survey was developed from previous survey instruments and was comprised of Likert scales and free-text questions (Appendix 3). Sixteen of the 22 items within the *current and preferred use of mobile learning and mobile technology* survey were derived from a previously validated survey (Appendix 5). Descriptive analyses were undertaken. The focus group study employed a semi-structured schedule that was developed by the researcher and primary supervisor. The schedule was scrutinised for question order and leading question or wording bias (Appendix 7). The researcher was aware of the potential for bias that could alter the veracity of data collected from each focus group. The researcher engaged in discussions with the primary supervisor regarding the potential for bias during the focus group sessions. The researcher prepared for the focus group study by ensuring familiarity with the questions. The researcher maintained a neutral approach to facilitation to avoid any social desirability bias. A second focus group was held with a group of the participants from the first focus group study to confirm the findings from the previous focus group research, which further reduced potential for bias (Appendix 8).

The semi-structured schedule for the individual interviews used similar questions to the focus group study (Appendix 10). The researcher minimised bias during these telephone interviews by using neutral but encouraging vocal sounds as body language was masked. The researcher also was familiar with the questions so that the interviews were less rehearsed, and flowed reducing the potential for acquiescence or confirmation bias. The focus group study and interviews were recorded. This enabled the researcher to read the transcriptions and listen to the recordings to gain participant perspectives. The primary supervisor was involved with member checking and constant comparison with the researcher during the coding of data. The researcher re-coded interviews to ensure there was parity in application of codes across the interviews. Two researchers were involved with coding from open, to axial and then selective codes to emergence of the sub-theme and themes.

10.5.7 Limitations of the study

The limitations of this study include gaining information from nurse supervisors and undergraduate nurses from only two Australian States. Recruitment for interviews from representatives from nursing profession organisations was problematic, which impacted the number of interviews that were convened during the study period. The low level of recruitment meant the findings may not be generalisable to the Australian nursing population. However, the congruency of the information obtained from each group and when triangulated across studies suggests nurses and nursing students in healthcare environments are unable to incorporate mobile learning into their workflow as a legitimate nursing function.

10.5.8 Strengths of the study

The main strength of the study was the willingness of nurse supervisors and undergraduate nurses to participate in this research. They volunteered their time and perspectives through completion of questionnaires, participation in focus groups and by undertaking interviews. Triangulation of the data across studies over time and within the different groups reveals participants highlighted similar barriers, challenges, risks and benefits of accessing or using mobile technology for learning at point of care in healthcare environments. The alignment of findings highlights the rationales that underpin the slow acceptance of mobile learning by nurses at point of care. As such, the results provide strong

evidence there is a need for systems and organisation level reform to enable positive transformation of learning at point of care at individual level.

10.5.9 Implications for practice

Until there is change within systems and organisation governance that provides clear direction about safe and appropriate use of mobile learning by nurses at point of care, confusion regarding the capacity to legitimately use mobile technology in Australian healthcare environments will endure. Local rules regarding the access and use of mobile technology in healthcare settings will prevail. Maintenance of the *status quo* will uphold the current 'mobile learning paradox', and the capacity of nurses to model digital professionalism to the next generation of nurses will remain a lost opportunity. Lack of regulatory governance will perpetuate an absence of support for nursing leadership to drive cultural change to promote incorporation of mobile learning into nursing workflows. The continued inability of accessing information in real-time at the bedside may contribute in some circumstances to poor decision-making, or potentiate errors by nurses that may compound poor patient outcomes.

Advancing nursing informatics practice requires an international approach as evidenced by the International Council of Nurses fact sheet (International Council of Nurses 2009) acknowledging nurses need to participate and influence informatics globally. Currently advances internationally are *ad hoc* and lack the standardisation or consistency that will be required if the nursing profession is to demonstrate leadership in informatics within healthcare environments. The Technology Informatics Guiding Education Reform (TIGER) initiative aims to provide informatics recommendations for nurses and develop informatics competencies (Honey and Proctor 2017; O'Connor 2017). The TIGER initiative also aims to influence stakeholders in adoption of these competencies through education, research and practice (Sensmeier et al 2017). This project now has representatives from 21 countries and is currently synthesising the commonalities to progress competencies for nurses globally. Once international competencies are expressed, this could be a way forward to promote digital professionalism and enable mobile learning for informal learning and CPD at point of care in Australian healthcare environments.

10.5.10 Impact Statement

Inability of nurses to use mobile technology at point of care in Australian healthcare environments negatively impacts nursing practice. The ability to access and use mobile learning at point of care has the potential to improve patient outcomes and promote 'learning moments' and outcomes of students.

Clear governance of mobile learning at a systems level is required, to enable a standardised approach to implementation of mobile learning by nurses within healthcare organisations. Ensuring preparedness of the nursing workforce will be necessary to achieve mobile learning becoming a legitimate nursing function.

10.5.11 Future research

This research has highlighted there is further work to be undertaken to ensure safe and appropriate use of mobile technology can be installed at point of care in Australian healthcare environments. Trialling for usability of mobile technology at point of care for informal learning and CPD needs to be undertaken. Clinical simulations can provide data about safety and quality of mobile learning at point of care. There is a need to develop a range of scenarios to test mobile learning and enable generation of data that can be used as evidence for developing standards, guidelines and policies regarding its use at point of care. This research can explore the barriers, challenges, risks and benefits of mobile learning in a safe environment. Workarounds and unintended consequences can be identified, prior to installation into the workplace. Additionally, acceptable boundaries will be revealed, which can guide a standardised approach to embedding mobile learning as legitimate nursing function.

Exploration of the patient perspective regarding mobile learning at point of care is overdue. Nurses' perceptions of patient inclusion in mobile learning was mixed. Participants believed patients did not approve of mobile learning. They also indicated that patients expected nurses to use mobile

technology as part of their care. Exploring patient expectations of being included in mobile learning opportunities and evaluation of the triad model will provide data to support or repudiate this adjunct method of learning in real-time at the bedside.

Research to capture the boundaries of safe and appropriate use of mobile learning in a range of healthcare environments within Australia and internationally, will provide evidence that will assist with developing guidelines, standards and policies about mobile technology will benefit all stakeholders. Enabling digital professionalism to flourish and become an integral component of professional identity formation will positively impact health service delivery. Provision of clear direction at a systems level will enable organisations to develop policies that can benefit protect health professionals and patients. Evaluation of the implementation of mobile learning as a legitimate nursing function will also need to be undertaken.

10.5.12 Concluding reflections

Mobile technology is ubiquitous in the environment, it connects end-users in ways that were previously unachievable. Expectations of information transfer and digital knowledge management have changed. If nurses are to remain contemporary in their field, it is mandatory they become conversant with the opportunities mobile learning provides. Part of this role is to ensure appropriate stewardship of mobile technology by nurses in healthcare environments. Nurses are the largest proportion of the health profession workforce and it is a duty of the profession to ensure safe and appropriate use of mobile technology in healthcare environments prevails. Advocating and undertaking for further research into how mobile technology for learning can be safely embedded into clinical nursing, administration and education is warranted. Only then, can the implementation of mobile learning become a legitimate nursing function.

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Appendices

Appendix 1

Authorship agreements

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M Hausen, E Borycki (+medium) A Kushniruk (eq) United States
P947-172. ISBN978-1-4666-6150-9

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All individuals acknowledged by name have provided their written consent in the location provided below (if applicable).

Declaration of Authorship

Name of Author	University Affiliation(s)	Signature of Author	Date
Carey Mather			11/01/2018
Elizabeth Cummings			11/01/2018

(insert additional rows as necessary)

Consent to be acknowledged by name (if applicable)

I consent to having my name listed in the acknowledgements section of the above research output:

Name of person being acknowledged	Signature of person being acknowledged	Date

(insert additional rows as necessary)

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- conception and design of the project
- analysis and interpretation of research data
- drafting significant parts of the work or critically revising it so as to contribute to the interpretation.

According to this definition, the author(s) of the research output titled:

Moving Past Exploration + adoption: Considering Priorities for implementing mobile learning by nurses

(enter title of book / book chapter / journal article / conference abstract / other publication)

submitted / resubmitted to: Studies in Health Technology + Informatics

(enter name of journal / publisher / conference / other medium)

on: 2017

(enter submission date)

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All individuals acknowledged by name have provided their written consent in the location provided below (if applicable).

Declaration of Authorship

Name of Author	University Affiliation(s)	Signature of Author	Date
Carey Mather			11/01/2018
Elizabeth Cummings			11/01/2018

(insert additional rows as necessary)

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- conception and design of the project
- analysis and interpretation of research data
- drafting significant parts of the work or critically revising it so as to contribute to the interpretation.

According to this definition, the author(s) of the research output titled:

Empowering learners : Using a triad model to promote ehealth literacy & transforming learning at point of care

(enter title of book / book chapter / journal article / conference abstract / other publication)

submitted / resubmitted to: knowledge management & e-learning

(enter name of journal / publisher / conference / other medium)

on: 2015

(enter submission date)

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All individuals acknowledged by name have provided their written consent in the location provided below (if applicable).

Declaration of Authorship

Name of Author	University Affiliation(s)	Signature of Author	Date
Carey Mather		Carey A Mather	11/02/2018
Elizabeth Cummings			11/01/2018

(*insert additional rows as necessary)*

Consent to be acknowledged by name (if applicable)

I consent to having my name listed in the acknowledgements section of the above research output:

Name of person being acknowledged	Signature of person being acknowledged	Date

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- analysis and interpretation of research data
- drafting significant parts of the work or critically revising it so as to contribute to the interpretation.

According to this definition, the author(s) of the research output titled:

Governing mobile Technology use for continuing

(enter title of book / book chapter / journal article / conference abstract / other publication)
Professional development in the Australian Nursing Profession

submitted / resubmitted to: BMC Nursing
(enter name of journal / publisher / conference / other medium)

on: 2017
(enter submission date)

is/are the undersigned, and there are no other qualified authors (unless written permission has been obtained from a qualified author to be excluded from the authorship list). All authors agree that they have met the above criteria for authorship and are satisfied with the order in which the authors' names appear in the research output. All authors agree that they are responsible for the content of the research output and approve of the version that will be / was submitted for publication.

All individuals acknowledged by name have provided their written consent in the location provided below (if applicable).

Declaration of Authorship

Name of Author	University Affiliation(s)	Signature of Author	Date
Carey Mather			11/01/2018
Elizabeth Cummings			11/01/2018
FRED GALE			25/01/2018

(insert additional rows as necessary)

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I consent to having my name listed in the acknowledgements section of the above research output:

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Organization: University of Tasmania

Address: Locked Bag 1322, Launceston, TASMANIA, AUSTRALIA 7250

E-mail: carey.mather@utas.edu.au

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10/2017

Carey Mather

From: Carry Koolbergen <C.Koolbergen@iospress.nl>
Sent: Tuesday, 16 January 2018 11:37 PM
To: Carey Mather
Subject: RE: Copyright permission: publication in iospress

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Carry Koolbergen (Mrs.)
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Not in the office on Wednesdays

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URL: www.iospress.nl

From: Carey Mather [mailto:carey.mather@utas.edu.au]
Sent: Saturday, January 13, 2018 7:33 AM
To: Kairi Look
Cc: Liz Cummings
Subject: Copyright permission: publication in iospress

Dear Kari

I (recently) published a number of articles in the *Studies in Health Technology and Informatics series*. The articles are:

Mather, C and Cummings, E, "Mobile learning: A workforce development strategy for nurse supervisors", *Studies in Health Technology and Informatics*, **204** pp. 98-103. doi:10.3233/978-1-61499-427-5-98 ISSN 0926-9630 (2014).

Mather, C and Cummings, E, "Usability of a virtual community of practice for workforce development of clinical supervisors", *Studies in Health Technology and Informatics*, **204** pp. 104-109. doi:10.3233/978-1-61499-427-5-104 ISSN 0926-9630 (2014).
Mather, C and Cummings, E and Allen, P, "Undergraduate nurses' preferred use of mobile devices in healthcare settings", *Studies in Health Technology and Informatics*, **208** pp. 264-268. doi:10.3233/978-1-61499-488-6-264 ISSN 0926-9630 (2015).
Mather, C and Cummings, E, "Unveiling the mobile learning paradox", *Studies in Health Technology and Informatics*, **218** pp. 126-31. doi:10.3233/978-1-61499-574-6-126 ISSN 0926-9630 (2015).
Mather, CA and Cummings, EA, "Issues for Deployment of Mobile Learning by Nurses in Australian Healthcare Settings", *Studies in Health Technology and Informatics*, **225** pp. 277-281. doi:10.3233/978-1-61499-658-3-277 ISSN 0926-9630 (2016).
Mather, C and Cummings, E, "Moving Past Exploration and Adoption: Considering Priorities for Implementing Mobile Learning by Nurses", *Studies in Health Technology and Informatics*, **241** pp. 63-68. doi:10.3233/978-1-61499-794-8-63 ISSN 0926-9630 (2017).

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Kind regards

Carey

Carey Mather FHEA (UK)
Lecturer
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T: +61 3 6324 3149| F: +61 3 6324 3952
Email: Carey.Mather@utas.edu.au | Web: www.utas.edu.au/health

To follow professional experience placement information:
http://blogs.utas.edu.au/snm-pep/
http://twitter.com/PEPCommunity/
http://twitter.com/CareyMather

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CRICOS Provider Code: 00586B

Carey Mather

Subject: FW: [JMIR Publications] Re: Copyright permission: publication in JMIR mHealth uHealth

From: Carey Mather
Sent: Sunday, 14 January 2018 11:51 AM
To: Elizabeth Cummings (Elizabeth.Cummings@utas.edu.au) <Elizabeth.Cummings@utas.edu.au>
Subject: FW: [JMIR Publications] Re: Copyright permission: publication in JMIR mHealth uHealth

https://jmir.zendesk.com/hc/en-us/articles/115001313067-Can-you-give-me-permission-to-publish-my-article-as-part-of-my-thesis-or-book-

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Editorial Director

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From: Editorial Director (JMIR Support) [mailto:support@jmir.org]
Sent: Sunday, 14 January 2018 1:25 AM
To: Carey Mather <carey.mather@utas.edu.au>
Subject: [JMIR Publications] Re: Copyright permission: publication in JMIR mHealth uHealth

- Please type your reply above this line -##

Your request (4635) has been updated. To add additional comments, reply to this email.

Editorial Director (JMIR Publications)
Jan 13, 09:25 EST

1

Dear Carey Mather,
Thanks for your inquiry.

An article covering your question can be found in our Help Center / Knowledge Base (KB).
Please see below for the suggested KB article(s).

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Your JMIR Support Team.

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Gunther Eysenbach,
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Carey Mather
Jan 13, 09:23 EST

Dear Gunther

I (recently) published "Nurses' use of mobile devices to access information in health care environments in Australia: A survey of undergraduate students" in the journal JMIR mHealth uHealth, 2 (4) Article e56. doi:10.2196/mhealth.3467 (http://dx.doi.org/10.2196/mhealth.3467) ISSN 2291-5222 (2014). I am seeking permission to include this publication as part of my PhD dissertation, which I plan to submit at the end of January 2018.

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Kind regards

Carey

Carey Mather FHEA (UK)
Lecturer

School of Health Sciences| College of Health and Medicine| University of Tasmania

Private Bag 1322, Launceston TAS 7250

T: +61 3 6324 3149| F: +61 3 6324 3952
Email: Carey.Mather@utas.edu.au | Web: www.utas.edu.au/health

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http://blogs.utas.edu.au/snm-pep/

http://twitter.com/PEPCommunity/

http://twitter.com/CareyMather

CRICOS Provider Code: 00586B

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Gunther Eysenbach MD, MPH, FACMI
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Senior Scientist, University Health Network
PI, Consumer Health Informatics & Public Health Informatics & EPublishing Lab

Co-Director, Communications & Knowledge Transfer, Techna Institute

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twitter:eysenbach

My papers: http://scholar.google.com/citations?hl=en&user=UjKmMQcAAAAJ

Attachment(s)
image001.png

Carey Mather

From: Ms. Xin Guo/MDPI AG <xin.guo@mdpi.com>
Sent: Monday, 15 January 2018 12:21 PM
To: Carey Mather
Cc: informatics@mdpi.com; Liz Cummings
Subject: Re: Copyright permission: publication in MDPI Informatics

Dear Carey,

As Informatics is an open access journal, you are the copyright holder of your paper. You can include your paper in your dissertation of course.

Wish you all the best!

Cheers,
Xin

On 2018/1/13 14:25, Carey Mather wrote:
> Dear Xin
>
> I recently published "Modelling digital knowledge transfer: Nurse
> Supervisors transforming learning at Point of Care to Advance Nursing
> Practice" in the journal /Informatics/, *4* (12) pp. 1-14.
> doi:10.3390/informatics4020012
> <http://dx.doi.org/10.3390/informatics4020012>ISSN 2227-9709 (2017). I
> am seeking permission to include this publication as part of my PhD
> dissertation, which I plan to submit at the end of January 2018.
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> the publication as per public record. I will also include a statement in
> the dissertation acknowledging I have been granted permission.
>
> An indication that you have authorised me to include this publication in
> my dissertation at your earliest convenience would be greatly appreciated.
>
> Kind regards
>
> Carey
>
> Carey Mather FHEA (UK)
> Lecturer**
>
> School of Health Sciences*| *College of Health and Medicine*|*University
> of Tasmania
>
> Private Bag 1322, Launceston TAS 7250 **
>
> T: +61 3 6324 3149*|* F: +61 3 6324 3952
> Email: Carey.Mather@utas.edu.au <mailto:Carey.Mather@utas.edu.au>

1

> *|* Web: www.utas.edu.au/health <http://www.utas.edu.au/health>
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>

Carey Mather

From: Carey Mather
Sent: Thursday, 25 January 2018 12:52 PM
To: Carey Mather
Subject: FW: Copyright permission: publication in Knowledge Management & E-Learning

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From: Maggie Minhong Wang [mailto:magwang@hku.hk]
Sent: Sunday, 14 January 2018 9:48 PM
To: Carey Mather <carey.mather@utas.edu.au>
Cc: Liz Cummings <elizabeth.cummings@utas.edu.au>
Subject: Re: Copyright permission: publication in Knowledge Management & E-Learning

Dear Carey,

Your message was received. In this case, you need to refer to your article published at the KM&EL journal in your dissertation.

Details of the copyright issues are available at the journal website
http://www.kmel-journal.org/ojs/index.php/online-publication/about/submissions#copyrightNotice

Best Regards,
Maggie

From: Carey Mather <carey.mather@utas.edu.au>
Sent: Saturday, January 13, 2018 14:09
To: Maggie Minhong Wang
Cc: Liz Cummings
Subject: Copyright permission: publication in Knowledge Management & E-Learning

Dear Maggie

I (recently) published "Empowering learners: Using a triad model to promote eHealth literacy and transform learning at point of care", in the journal *Knowledge Management & E-Learning*, **7** (4) pp. 629-645. ISSN 2073-7904 (2015). I

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Many thanks

Kind regards

Carey

Carey Mather FHEA (UK)
Lecturer
School of Health Sciences| College of Health and Medicine| University of Tasmania
Private Bag 1322, Launceston TAS 7250
T: +61 3 6324 3149| F: +61 3 6324 3952
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To follow professional experience placement information:
http://blogs.utas.edu.au/snm-pep/
http://twitter.com/PEPCommunity/
http://twitter.com/CareyMather

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CRICOS Provider Code: 00586B

Carey Mather

From: Aronin, Tovah, BioMed Central Ltd. <tovah.aronin@biomedcentral.com>
Sent: Wednesday, 17 January 2018 1:50 AM
To: Carey Mather
Subject: RE: Copyright permission: publication in BMC Nursing

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Best wishes,
Tovah

Tovah Honor Aronin, Ph.D.
Editor
BMC-series Journals
BioMed Central
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New York, NY 10004-1562
USA
tovah.aronin@biomedcentral.com

From: Carey Mather [mailto:carey.mather@utas.edu.au]
Sent: Saturday, January 13, 2018 1:45 AM
To: Aronin, Tovah, BioMed Central Ltd.
Cc: Liz Cummings
Subject: Copyright permission: publication in BMC Nursing

Dear Tovah

I recently published *Governing mobile technology use for continuing professional development in the Australian nursing profession* in the journal *BMC Nursing*, **16** pp. 1-11. doi:10.1186/s12912-017-0212-8 ISSN 1472-6955 (2017). I am seeking permission to include this publication as part of my PhD dissertation, which I plan to submit at the end of January 2018.

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An indication that you have authorised me to include this publication in my dissertation at your earliest convenience would be greatly appreciated.

Kind regards

Carey

1

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Email: Carey.Mather@utas.edu.au | Web: www.utas.edu.au/health

To follow professional experience placement information:
http://blogs.utas.edu.au/snm-pep/
http://twitter.com/PEPCommunity/
http://twitter.com/CareyMather

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Appendix 2

Use of digital technology by clinical facilitators information sheet

Invitation

This study is to enable the SNM to establish a profile of your/digital/computing/internet experience. This information will be collated to enable the facilitation of effective communication, using digital technology, with clinical facilitators and preceptors of the University of Tasmania undergraduate students.

What is the purpose of this study?

This survey is part of a Teaching Development Grant being undertaken to evaluate the potential and use of social software to develop a community of practice or network of clinical facilitators.

Why have I been invited to participate?

Any registered nurse who undertakes clinical facilitation of Bachelor of Nursing undergraduate students is eligible to participate.

Your participation is voluntary and there are no consequences if you decide not to proceed with completion of the survey.

What will I be asked to do?

Participants are asked to complete a survey about the use of digital technology. Later in the project at the end of semester 2, 2012, you will be asked to feedback about your level of participation in the community of practice or network of clinical facilitators. The feedback is important to provide information about evaluating the usefulness of social software as a method to disseminate and share resources and information about clinical facilitation.

Are there any possible benefits from participation in this study?

Participation in this study will provide base-line information about the use of digital technology by clinical facilitators. The results will provide information about learning and teaching regarding support and guidance necessary to engage clinical facilitators in using this community of practice or network.

Are there any possible risks from participation in this study?

There are no risks identified from participation in this study.

What if I change my mind during or after the study?

Participants can withdraw at any time and that they can do so without providing an explanation. However, as data collected is anonymous, it will not be possible to remove it from the study. Data will be stored electronically within the Faculty of Health Science information communication network. It will be password protected and destroyed by deletion in 2019.

How will the results of the study be published?

Study findings will be disseminated at a local level through the UTAS Teaching Matters conference and through appropriate national or international clinical education networks. Submission of an article to a peer-reviewed journal will also be undertaken. Only pooled data will be used and participants will not be identifiable in the publication of the results.

What if I have questions about this study?

If you have any queries or would like clarification about this study please contact:

Carey.Mather@utas.edu.au

Academic, Professional Experience

School of Nursing and Midwifery

Locked Bag 1322, Launceston 7250

Telephone: 03 6324 3149

This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study, please contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. Please quote ethics reference number [H12527]".

This information sheet is for you to keep. Consent is implied by completion and submission of the survey.

Thank you for your time.

Appendix 3

Use of Digital Technology by Clinical Facilitators

To enable the SNM to establish a profile of your digital/computing/internet experience could you please respond about your usage? This information will enable the SNM PEP team to facilitate effective communication, using digital technology, with clinical facilitators and preceptors of University of Tasmania undergraduate students.

This survey can take less than 5 minutes to complete.
There are 28 questions in this survey

Demographics

1 [B1]Your age range *

Please choose **only one** of the following:
Under 21 years
21-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
60 plus

2 [B2]Your gender *

Please choose **only one** of the following:
Female
Male

3 [B3]In your current role your job title is: *

Please choose **only one** of the following:
Carer or assistant in nursing
Enrolled nurse
Registered nurse
Clinical nurse
Nurse educator or Clinical facilitator
Other

4 [B4]How many years have you mentored, preceptored or clinically facilitated BN students? *

Please choose **only one** of the following:
< 1 year
1 or 2 years
3 to 5 years
5 or more years

5 [B5]Geographically where is your workplace situated? *

Please choose **only one** of the following:
Urban (Hobart or Sydney and environs)
Regional (Launceston, Devonport, Burnie etc)
Rural or Remote (Swansea, Queenstown, Huonville etc)
Other

6 [B6]The main focus of the health care provided by your workplace is: *

Please choose **only one** of the following:
Tertiary or secondary acute care facility (major hospital)
District hospital
Community / primary health care centre or organisation
Mental health care organisation
Residential aged care facility
Multipurpose health centre
GP surgery
Other

Computer use

7 [A1]How many years have you been using computers? *

Please choose **only one** of the following:
Health Science Survey - Use of Digital Technology by Clinical Facilitators

http://www.healthsci.utas.edu.au/survey/admin/admin.php?action=showprintablesurvey&sid=47562[17/04/2012 4:51:03 PM]

Less than one year
More than 1 year but less than 2 years
More than 2 years but less than 5 years
More than 5 years

8 [A2]How many years have you been using the internet? *

Please choose **only one** of the following:
Less than one year
More than 1 year but less than 2 years
More than 2 years but less than 5 years
More than 5 years

9 [A3]When you use computers or the internet, what do you primarily use them for? (Rank in order from 1 being the most use). *

Please number each box in order of preference from 1 to 6
Education
Work /business
Gathering product information
Communicating with others using email
Communicating with others using social media
Gathering information for personal needs

10 [A4]What level do you rate your computer proficiency *

Please choose **only one** of the following:
I can generally do what I need without difficulty
I can do what I need, and I would like to know more
I get frustrated because I do not know how to do what I need
I cannot seem to do what I need easily

11 [A5]In terms of percentages, how much of your work-related communication is: *

Please choose the appropriate response for each item:
Less than 25%
More than 25% but less than 50%

More than 50% but
less then 75% More than 75%
Face to face
Over the phone
Over email
Over video conference

12 [A6]Do you own a smart phone? *

Please choose **only one** of the following:
Yes
No
Don't know

13 [A7]Have you ever purchased an application (app) from an app store (either the Apple one, or from a competitor such as Google). *

Please choose **only one** of the following:
Yes
No
Don't Know

14 [A8]Do you have an iTunes account to download or purchase apps? *

Please choose **only one** of the following:
Yes
No
Don't know

15 [A9]Do you know how to use the app known as Skype? *

Please choose **only one** of the following:
Yes
No
Don't know

16 [A10]Have you ever used social media (Facebook, Twitter, Google+, and LinkedIn)? *

Please choose **only one** of the following:
Yes
No
Don't know

17 [A11]Do you view work related media on YouTube?

Please choose **only one** of the following:
Never, or less than once a month
1 - 3 times per month
Once per week
2 - 4 times per week
5 - 6 times per week
Once per day
2 - 3 times per day
4 - 5 times per day
6+ times per day

18 [A12]If so what do you use? Rank in order of use (1 being the most used) *

Please number each box in order of preference from 1 to 4
Facebook
Google+
LinkedIn

Twitter

19 [A12]Briefly describe what is meant by the term blogging
Please write your answer here:

20 [A13]Have you ever tried blogging yourself? *
Please choose **only one** of the following:
Yes
No
Don't know

21 [A14]
Briefly describe what is meant by the term wiki
Please write your answer here:

22 [A15]Have you ever contributed to a wiki project? *
Please choose **only one** of the following:
Yes
No
Don't know

23 [A16]What do you perceive you need to know to use digital technology effectively as part of a clinical facilitator network or community of practice? Please explain
Please write your answer here:

24 [A17]Select your level of agreement with the following statements *
Please choose the appropriate response for each item:
Always Usually Sometimes Never
I believe that a clinica lfacilitator network or community or practice could enable me to communicate effectivelywith the University about University related information
I believe a clinical facilitator network or community or practice could enable me to communicate effectively with other clinical facilitators
I believe that using digital technology could enable me to share information with my colleagues in the community of practice I believe that I can learn to use the digital technology to enable me to share information with my colleagues in the community of practice and network with them about clinical facilitation issues.
I believe that I will join the clinical facilitator network or community or practice so that I can communicate effectively with the University about University related information
I believe that I will join the clinical facilitator network or community or practice so that I can communicate effectively with other clinical facilitators
I believe that I will use digital technology to share information with my colleagues in the community of practice
Health Science Survey - Use of Digital Technology by Clinical Facilitators

I believe I will share by using the SNM PEPCommunity blog comments section
I believe I will share by using the PEPCommunity community of practice site (Twitter) #PEPCommunity

25 [A18]What information do you hope that such a network would make available to you?
Please describe
Please write your answer here:

26 [A19]How often would you expect to receive information regarding clinical facilitation?
*

Please choose **only one** of the following:
At least once per week
At least once per fortnight
At least once per month
Ad hoc, as necessary

27 [A20]How often would you like to receive information regarding the University and student information? *

Please choose **only one** of the following:
At least once per week
At least once per fortnight
At least once per month
Ad hoc, as necessary

28 [A21]Do you have any other comments or suggestions that could improve your experience of belonging to a clinical facilitator's network or community of practice about clinical facilitation?

Please write your answer here:

Thank you very much for your time

Thank you for completing this survey.

Appendix 4

Current and preferred use of mobile learning and mobile technology survey information sheet

Scoping the use of mobile learning platforms by nurses in primary health care settings: A pilot study

Invitation

The purpose of the study is to provide background information about the current and preferred use of mobile platforms in primary health care settings by health professionals. The findings of this research will provide direction for further research to develop robust policy and guidelines for the use of mobile technology by health professionals in health care environments.

Health professionals use a complex network of communication strategies to share important information within multidisciplinary teams to improve patient or client outcomes and ensure high quality care is safely delivered. Building on the ubiquitous use of a variety of communication strategies can transform how learning within the workplace is delivered and accessed. By extending communication beyond the borders of the workplace it is possible to improve access and enable a flexibility that is unprecedented. Current regulation about the use of mobile learning platforms has not kept pace with current practice. The use of mobile technologies is the way of the future for health professionals to learn in situ. Access to mobile learning opportunities is essential for health professionals to be contemporary in their knowledge and use best practice to ensure high quality and safe care.

Elizabeth.Cummings@utas.edu.au

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School of Nursing and Midwifery

Private Bag 135, Hobart 7001

Carey.Mather@utas.edu.au

Lecturer

School of Nursing and Midwifery

Locked Bag 1322, Launceston 7250

What is the purpose of this study?

The main objective of this study is to scope the current and preferred use of mobile learning and mobile technology by undergraduate nurses, preceptors and clinical supervisors of nurses within primary health care settings. The type and preference of technology, anticipated risk and current behaviour associated with using mobile technology is being explored.

Why have I been invited to participate?

Any health professional who undertakes clinical supervision of health science undergraduate students and any final year nursing student undertaking professional experience in primary health care settings are eligible to participate.

Your participation is voluntary and there are no consequences if you decide not to proceed with completion of the survey or if you are a clinical supervisor, undertake a telephone interview.

What will I be asked to do?

Your participation will involve completion of a survey that seeks to capture your current and preferred use of mobile learning platforms and mobile technology while being involved with PEP. Consent to participate is acknowledged by completion and submission of the survey.

Clinical supervisors can provide further information by completing a short telephone interview seeking information about access to mobile technology at point of care in primary health settings. A separate written consent form is provided before any telephone interview is undertaken.

Each survey will take approximately 5 minutes to complete.

Are there any possible benefits from participation in this study?

Potential benefits could be the improvement of learning and teaching while undertaking PEP; increasing access to learning and teaching tools and improvement of quality and safety of patients at point of care.

Are there any possible risks from participation in this study?

No risks have been identified from participation in this study.

What if I change my mind during or after the study?

Participants can withdraw at any time and that they can do so without providing an explanation. However, as data collected is anonymous, it will not be possible to remove it from the study.

What will happen to the information when this study is over?

Data will be stored electronically within the Faculty of Health Science information communication network. It will be password protected and destroyed by deletion in 2020.

How will the results of the study be published?

Study findings will be disseminated through appropriate national or international clinical education networks. Only pooled data will be used and participants will not be identifiable in the publication of the results.

What if I have questions about this study?

If you have any queries or would like clarification about this study please contact:

Carey.Mather@utas.edu.au

Academic, Professional Experience
School of Nursing and Midwifery
Locked Bag 1322, Launceston 7250

Telephone: 03 6324 3149

Elizabeth.Cummings@utas.edu.au

Senior Lecturer

School of Nursing and Midwifery
Private Bag 135, Hobart 7001
Telephone: 03 6226 4689

"This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study, please contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. Ethics reference number H12527".

Consent is implied by completion and submission of the surveys

A separate written consent form will be provided to clinical supervisors before any interview is undertaken.

This information sheet is for you to keep.

Appendix 5

Current and preferred use of mobile learning and mobile technology survey

Scoping the use of mobile learning platforms by nurses in health care settings:

A pilot study

Preceptors and clinical supervisors survey

The main objective of this study is to scope the current and preferred use of mobile learning and mobile technology by undergraduate nurses, preceptors and clinical supervisors of nurses within health care settings. The type and preference of technology, anticipated risk and current behaviour associated with using mobile technology is being explored.

Part 1 About you

1. What is your age group? (Please circle the most appropriate number)

1 Under 21 years
2 21 to 25 years
3 26-30 years
4 31-35 years
5 36-40 years
6 41-45 years
7 46- 50 years
8 51-55 years
9 56- 60 years
10 Over 60 years

2. What is your gender? (Please tick)

1 Female
2 Male

3. Is a language other than English spoken at your home:

1. Yes

2. No

If yes, please list which language(s) _____

4. What is the highest level of education you completed prior to this course?

1. Secondary school
2. Vocational certificate or diploma (e.g., TAFE)
3. Undergraduate university degree or diploma
4. Postgraduate university degree or diploma

5. Please indicate the State where you are predominantly undertaking PEP:

1 Tasmania
2 New South Wales

3 Other _____

6. Please indicate the focus of care provided by your health care organisation:

1. Tertiary or secondary acute care facility (major hospital)
2. District hospital
3. Community / primary health care centre or organisation
4. Mental health care organisation
5. Residential aged care facility
6. Multipurpose health centre
7. GP surgery
8. Other, please describe_____

Part 2: Exploring portable and mobile technology access and use

To define the context of the question about portable or mobile technology devices there are two definitions provided to assist with determining when a portable or mobile technology device is used by health professions in health care settings.

Professional experience placement **(PEP)** is the term used to describe work integrated or workplace learning undertaken by students in health care settings.

Away from PEP means when you are not undertaking placement as part of your studies.

During PEP means when you are undertaking workplace learning or clinical placement hours in a health care setting as part of your study.

7. Do you have current access to portable or mobile technology devices?

1 Yes, please go to question 9
2 No, please go to question 13

8. Current use of portable or mobile technology devices

Please circle one of the following responses for each of these questions that best describes which of the following portable or mobile devices you currently use (or have regularly available to you) away from PEP or during PEP.

Please indicate on a scale of 1-5 your use of these mobile devices.

1: Low use **3: Medium use** **5: High use**

Away from PEP					**Self-assessment of your current mobile or portable device use**	**During PEP**				
1	2	3	4	5	Mobile telephone (not smartphone ie no Internet browsing or email)	1	2	3	4	5
1	2	3	4	5	Mobile telephone (smartphone ie Internet browsing andr email)	1	2	3	4	5
1	2	3	4	5	Audio player (eg mp3 player, ipod shuffle)	1	2	3	4	5
1	2	3	4	5	Video media player (eg video capable, MP 4 player, ipod)	1	2	3	4	5
1	2	3	4	5	Lap top computer	1	2	3	4	5
1	2	3	4	5	Mini laptop, Netbook or hand held computer (uses Wifi, not for large GB storage)	1	2	3	4	5
1	2	3	4	5	Mini tablet computer	1	2	3	4	5
1	2	3	4	5	Tablet computer	1	2	3	4	5

9. Accessing information using a portable or mobile technology device

Please circle one of the following responses for each of these questions that best describes your use of portable or mobile devices to access information.

Please indicate on a scale of 1-5 your use of these mobile devices.

1: Never 2: Once per day 3: 2-5 times per day 4: >5 times per day 5: Not applicable

Away from PEP					**Self-assessment of your current mobile or portable device use**	**During PEP**				
1	2	3	4	5	I access work-related drug references	1	2	3	4	5
1	2	3	4	5	I access work-related nursing/medical information	1	2	3	4	5
1	2	3	4	5	I access work-related protocols	1	2	3	4	5
1	2	3	4	5	I use the device as a calculator for nursing/medical formulas	1	2	3	4	5
1	2	3	4	5	I use the device as a clock or stop watch	1	2	3	4	5
1	2	3	4	5	I access sites for professional education and development	1	2	3	4	5
1	2	3	4	5	I access sites for patient handouts and teaching	1	2	3	4	5
1	2	3	4	5	I access work-related apps that assist patient or client care	1	2	3	4	5
1	2	3	4	5	I use it to communicate with other members of the health care team to coordinate patient or client care	1	2	3	4	5
1	2	3	4	5	I check/send personal text messages or emails to family or friends	1	2	3	4	5

1	2	3	4	5	I shop on the Internet	1	2	3	4	5
1	2	3	4	5	I check/post on social networking sites (Facebook, Twitter, Snapchat etc)	1	2	3	4	5
1	2	3	4	5	I play online games	1	2	3	4	5
1	2	3	4	5	I check/send study related text messages or emails to friends or co-workers	1	2	3	4	5
1	2	3	4	5	I check/send study related text messages or emails to my academic supervisors	1	2	3	4	5
1	2	3	4	5	I conduct personal business online (eg paying bills, banking)	1	2	3	4	5
1	2	3	4	5	I access University related sites (eg MyLO) to assist with progression of my studies	1	2	3	4	5
1	2	3	4	5	I access study related sites (eg library, journal articles) to assist with progression of my studies	1	2	3	4	5
1	2	3	4	5	I browse (eg use a search engine Google, Safari etc) for information to assist with progression of my studies	1	2	3	4	5
1	2	3	4	5	I submit assessment tasks	1	2	3	4	5
1	2	3	4	5	I check/send personal text messages or emails to co-workers	1	2	3	4	5

(Adapted from McBride, Le Vasseur and Dongmei 2013)

10. Proposed use of portable or mobile technology devices

Which of the following portable or mobile devices would you use if you had access away from PEP or during PEP if you were able to use them?

Please indicate on a scale of 1-5 your use to these mobile devices.

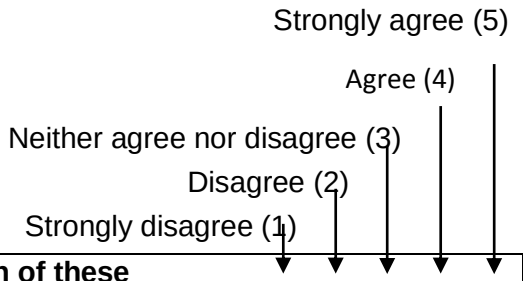
1: Low use **3: Medium use** **5: High use**

Away from PEP					**Self-assessment of your proposed mobile or portable device use**	**During PEP**				
1	2	3	4	5	Mobile telephone (not smartphone ie no Internet browsing or email)	1	2	3	4	5
1	2	3	4	5	Mobile telephone (smartphone ie Internet browsing or email)	1	2	3	4	5
1	2	3	4	5	Audio player (eg mp3 player, ipod shuffle)	1	2	3	4	5
1	2	3	4	5	Video media player (eg video capable, MP 4 player, ipod)	1	2	3	4	5
1	2	3	4	5	Lap top computer	1	2	3	4	5
1	2	3	4	5	Mini laptop, Netbook or hand held computer (uses Wifi, not for large storage)	1	2	3	4	5
1	2	3	4	5	Mini tablet computer	1	2	3	4	5
1	2	3	4	5	Tablet computer	1	2	3	4	5

11. Opinions of portable or mobile technology device use

Please circle one of the following responses for each of these questions that best describes which of the following portable or mobile devices you currently use (or have regularly available to you) away from PEP or during PEP.

Please indicate on a scale of 1-5 your level of agreement with the statements.



	Please circle one of the following responses for each of these questions that best describes your opinion of portable or mobile device use					
1	I believe portable and mobile devices could be beneficial to patient and client care	1	2	3	4	5
2	I believe portable and mobile devices could be distracting to patient and client care	1	2	3	4	5
3	I believe portable or mobile devices can be a useful for learning during PEP	1	2	3	4	5
4	I believe portable or mobile devices can be a useful for learning away from PEP	1	2	3	4	5
5	I believe patients or clients think portable or mobile devices could be beneficial their care	1	2	3	4	5
6	I believe patients or clients think portable or mobile devices could be distracting to their care	1	2	3	4	5
7.	I believe other health profession staff think portable or mobile devices could be beneficial patient or client care	1	2	3	4	5
8	I believe other health profession think portable or mobile devices could be distracting to patient or client care	1	2	3	4	5
9	I believe other health profession staff think portable or mobile devices could be beneficial to accessing learning or professional education and development information during PEP	1	2	3	4	5
10	I believe other health profession staff think portable or mobile devices would not be useful for accessing learning or professional education information during PEP	1	2	3	4	5
11	I am confident in using portable or mobile technology devices for communication during PEP	1	2	3	4	5
12	I am confident in using portable or mobile technology devices for communication away from PEP	1	2	3	4	5
13	I am confident in using portable or mobile technology devices for study purposes during PEP	1	2	3	4	5
14	I am confident in using portable or mobile technology devices for study purposes away from PEP	1	2	3	4	5

PART 3: Reflections on accessing or using a portable or mobile device

Please list any barriers in your opinion to using portable or mobile technology devices during PEP.

.....
.....
.....
.....
.....

Please describe any opportunities that you believe could impact on the use of portable or mobile technology devices during PEP.

.....
.....
.....
.....
.....

Do you have any comments about the access or use of portable or mobile technology devices during PEP.

.....
.....
.....
.....
.....

Thank you for your time

Scoping the use of mobile learning platforms by clinical supervisors, facilitators and preceptors in health care settings: A pilot study

Undergraduate nurses

The main objective of this study is to scope the current and preferred use of mobile learning and mobile technology by clinical supervisors, facilitators and preceptors of nurses within health care settings. The type and preference of technology, anticipated risk and current behaviour associated with using mobile technology is being explored.

Part 1: About you

4. What is your age group? (Please circle the most appropriate number)

1 Under 21 years
2 21 to 25 years
3 26-30 years
4 31-35 years
5 36-40 years
6 41-45 years
7 46- 50 years
8 51-55 years
9 56- 60 years
10 Over 60 years

5. What is your gender? (Please circle)

3 Female
4 Male

6. Is a language other than English spoken at your home

1. Yes

2. No

If yes, please list which language(s) _____

7. **Please indicate ALL your professional qualifications:**

_____

8. Please indicate your experience as a clinical supervisor, professional experience supervisor or preceptor:

1 First time
2 Less than one year
3 Between one and two years
4 More than two years and less than five years
5 More than five years

9. Please indicate the State where you are predominantly supervising, facilitating or preceptoring students undertaking PEP?

4 Tasmania
5 New South Wales
6 Other _____

12. Please indicate the focus of care provided by your health care organisation:

9. Tertiary or secondary acute care facility (major hospital)
10. District hospital
11. Community / primary health care centre or organisation
12. Mental health care organisation
13. Residential aged care facility
14. Multipurpose health centre
15. GP surgery
16. Other, please describe_____

Part 2: Exploring portable and mobile technology access and use

13. Do you have current access to portable or mobile technology devices?

3 Yes, please go to question 9
4 No, please go to question 13

14. Current access to portable or mobile technology devices

Which of the following portable or mobile devices do you have regularly available to you in the work place.

Please indicate on a scale of 1-5 your access to these mobile devices.

1: Low access **3: Medium access** **5: High access**

Self-assessment of your access to portable or mobile device use	**in the work place**				
Mobile telephone (not smartphone ie no Internet browsing or email)	1	2	3	4	5
Mobile telephone (smartphone ie Internet browsing or email)	1	2	3	4	5
Audio player (eg mp3 player, ipod shuffle)	1	2	3	4	5
Video media player (eg video capable, MP 4 player, ipod)	1	2	3	4	5
Lap top computer	1	2	3	4	5
Mini laptop, Netbook or hand held computer (uses Wifi, not for large storage)	1	2	3	4	5
Mini tablet computer	1	2	3	4	5
Tablet computer	1	2	3	4	5

15. Current use of portable or mobile technology devices

Please circle one of the following responses for each of these questions that best describes which of the following portable or mobile devices you currently use (or have regularly available to you) in the work place.

Please indicate on a scale of 1-5 your use of these mobile devices.

1: Low use **3: Medium use** **5: High use**

Self-assessment of your current portable or mobile device use	**In the work place**				
Mobile telephone (not smartphone ie no Internet browsing or email)	1	2	3	4	5
Mobile telephone (smartphone ie Internet browsing and email)	1	2	3	4	5
Audio player (eg mp3 player, ipod shuffle)	1	2	3	4	5
Video media player (eg video capable, MP 4 player, ipod)	1	2	3	4	5
Lap top computer	1	2	3	4	5
Mini laptop, Netbook or hand held computer (uses Wifi, not for large GB storage)	1	2	3	4	5
Mini tablet computer	1	2	3	4	5
Tablet computer	1	2	3	4	5

11. Proposed use of portable or mobile technology devices

Which of the following portable or mobile devices would you use if you had access away in the work place if you were able to use them?

Please indicate on a scale of 1-5 your use of these mobile devices.

1: Low use **3: Medium use** **5: High use**

Self-assessment of your current portable or mobile device use	**In the work place**				
Mobile telephone (not smartphone ie no Internet browsing or email)	1	2	3	4	5
Mobile telephone (smartphone ie Internet browsing and email)	1	2	3	4	5
Audio player (eg mp3 player, ipod shuffle)	1	2	3	4	5
Video media player (eg video capable, MP 4 player, ipod)	1	2	3	4	5
Lap top computer	1	2	3	4	5
Mini laptop, Netbook or hand held computer (uses Wifi, not for large GB storage)	1	2	3	4	5
Mini tablet computer	1	2	3	4	5
Tablet computer	1	2	3	4	5

12. Accessing information using a portable or mobile technology device

Please circle one of the following responses for each of these questions that best describes your use of portable or mobile devices to access information.

Please indicate on a scale of 1-5 your use of these mobile devices.

1: Never 2: Once per day 3: 2-5 times per day 4: >5 times per day 5: Not applicable

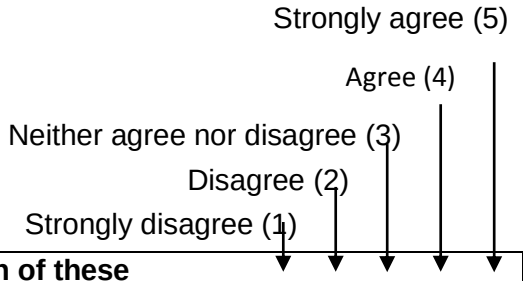
Self-assessment of your current portable or mobile device use	**In the work place**				
I access work-related drug references	1	2	3	4	5
I access work-related nursing/medical information	1	2	3	4	5
I access work-related protocols	1	2	3	4	5
I use the device as a calculator for nursing/medical formulas	1	2	3	4	5
I use the device as a clock or stop watch	1	2	3	4	5
I access sites for professional education and development	1	2	3	4	5
I access sites for patient handouts and teaching	1	2	3	4	5
I access work-related apps that assist patient or client care	1	2	3	4	5
I use it to communicate with other members of the health care team to coordinate patient or client care	1	2	3	4	5
I check/send personal text messages or emails to family or friends	1	2	3	4	5
I shop on the Internet	1	2	3	4	5
I check/post on social networking sites (Facebook, Twitter, Snapchat etc)	1	2	3	4	5
I play online games	1	2	3	4	5
I check/send study related text messages or emails to friends or co-workers	1	2	3	4	5
I check/send study related text messages or emails to academic supervisors	1	2	3	4	5
I conduct personal business online (eg paying bills, banking)	1	2	3	4	5
I access study related sites (eg library, journal articles) to assist with professional development	1	2	3	4	5
I browse (eg use a search engine Google, Safari etc) for professional development information	1	2	3	4	5
I check/send personal text messages or emails to co-workers	1	2	3	4	5

(Adapted from McBride, Le Vasseur and Dongmei 2013)

13. Opinions of portable or mobile technology device use

Please circle one of the following responses for each of these questions that best describes which of the following portable or mobile devices you currently use (or have regularly available to you) away from PEP or during PEP.

Please indicate on a scale of 1-5 your level of agreement with the statements.



	Please circle one of the following responses for each of these questions that best describes your opinion of portable or mobile device use					
1	I believe portable and mobile devices could be beneficial to patient and client care	1	2	3	4	5
2	I believe portable and mobile devices could be distracting to patient and client care	1	2	3	4	5
3	I believe portable or mobile devices can be a useful for learning in the work place	1	2	3	4	5
5	I believe patients or clients think portable or mobile devices could be beneficial their care	1	2	3	4	5
6	I believe patients or clients think portable or mobile devices could be distracting to their care	1	2	3	4	5
7	I believe other health profession staff think portable or mobile devices could be to beneficial patient or client care	1	2	3	4	5
8	I believe other health profession staff think portable or mobile devices could be distracting to patient or client care	1	2	3	4	5
9	I believe other health profession staff think portable or mobile devices could be beneficial to accessing learning or professional education and development information	1	2	3	4	5
11	I am confident in using portable or mobile technology devices for communication in the work place	1	2	3	4	5

PART 3: Reflections on accessing or using a portable or mobile device

Please list any barriers in your opinion to using portable or mobile technology devices in the work place

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Please describe any opportunities that you believe could impact on the use of portable or mobile technology devices in the work place.

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Do you have any comments about the access or use of portable or mobile technology devices in the work place.

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Thank you for your time

Appendix 6

Nurse supervisor focus group information sheet

Scoping the use of mobile learning platforms by nurses in health care settings: A pilot study

What is the purpose of this study?

The purpose of the study is to provide background information about the current and preferred use of mobile platforms in health care settings by health professionals. The findings of this research will provide direction for further research to develop robust policy and guidelines for the use of mobile technology by health professionals in health care environments.

The type and preference of technology, anticipated risk and current behaviour associated with using mobile technology is being explored.

Why have I been invited to participate?

Any health professional who undertakes clinical supervision of health science undergraduate students and any final year nursing student undertaking professional experience in health care settings are eligible to participate.

Your participation is voluntary and there are no consequences if you decide not to proceed with completion of the survey or if you are a clinical supervisor, undertake a telephone interview or participate in a focus group.

What will I be asked to do?

Your participation will involve completion of a survey that seeks to capture your current and preferred use of mobile learning platforms and mobile technology while being involved with PEP. Consent to participate is acknowledged by completion and submission of the survey. A separate written consent form is provided before any focus group participation or telephone interview is undertaken.

Each survey will take approximately 5 minutes to complete.

Clinical supervisors can provide further information by completing a short interview seeking information about access to mobile technology at point of care in primary health settings. A separate written consent form is provided before any focus group participation or telephone interview is undertaken.

Appendix 7

Nurse supervisor focus group 1 schedule

Scoping the use of mobile learning platforms by nurses in health care settings: A pilot study

Interview schedule for clinical supervisors, professional experience facilitators or preceptors

Project Aim: The purpose of the study is to provide background information about the current and preferred use of mobile platforms in health care settings. The findings will inform development of further research to provide direction for development of robust policy and guidelines for the use of mobile learning technology by health professionals in health care environments.

Schedule Aim: Investigate experiences and perceptions from the clinical supervisor's perspective.

Int time/date		**Int location**	

Key Questions	**Funneling Question**	**Notes**
These questions will be asked of all interviewees and will form the basis of the interview.	Optional, to encourage depth of response OR getting the interview back on track if it strays off topic.	
Ethics preamble: [Summary to be taken from consent package]		Summarise, but also give time for facilitator to read though.

Icebreaker: Before we get into some specific questions, tell me generally what do you think about using portable or mobile technology in the workplace?		To illicit story-telling, to get general concerns/anxieties/pre-scripted statements out of the way and establish rapport.
Phase 1. Use of portable or mobile technology devices		
1. Can you use portable or mobile technology devices in the work place?	2. If yes, what can you use them for?	
2. If no, what do you think portable or mobile technology devices could be useful for in the workplace?	a. Positives b. Negatives	
Phase 2: Mobile learning		
3. Now I'd like to move on to talk about the potential of learning using portable or mobile technology devices in the workplace. Can you explain to me in your own words how portable or mobile technology could change learning in the workplace?		
4. What are the limitations you perceive to portable or mobile technology devices for learning in context/in situ at your workplace?	a. Positives b. Negatives	
5. Do you believe access to portable or mobile learning environments could impact on patient or client safety?	a. Positives b. Negatives	
6. Do you have any opinion on perceptions of public about health professionals using portable or mobile technology in the workplace?	a. Positives b. Negatives	

7. Do you have any opinion on perceptions of other health professionals using portable or mobile technology in the workplace?	a. Positives b. Negatives	

Phase 3: General opinion		
8. Moving away from portable or mobile technology devices, to finish up I want to ask a few questions about your internet use and continuing professional development more broadly. Would you say you are a frequent internet user?	a. Email b. Facebook/Twitter c. Banking/shopping d. Other forums? e. IM?	
9. Would you describe yourself as a 'confident' internet user?	a. How often do need help/how often are you afraid you've done the wrong thing/broken something?	
10. What do you currently do for continuing professional development to meet the requirements for AHPRA?	a. If you use web-based resources can you give examples of what you have accessed or used? b. What is your opinion of using mobile learning to achieve some of your CPD requirements?	
Wrap up: Thank you for your time, your insights, and your ideas about using portable or mobile technology in the workplace.		

Further interviewer observations and notes:

Appendix 8

Nurse supervisor focus group 2 schedule

Session outline

13 July 2015

1. Outline summary of findings of focus groups data on current use of mobile learning by clinical supervisors (5 mins)

2. Provide each participant with cards with the themes noted on them and ask them to prioritise the themes from most important to least important from a clinical supervisor perspective. (5 minutes)

3. Photo each one and collate results on the white board. Once ordered with consensus, ask if there are any new issues or thoughts that arise from the findings? (10 mins)

4. Ask the clinical supervisors: How can mobile learning become a legitimate nursing function for L&T by them? ie what actions can they take to progress the use of mobile learning in their workplace? What are the barriers to deploying / implementing mobile learning in their work.. Put these onto butchers paper in 2 columns labelled actions and barriers (10 minutes)

5. Ask the clinical supervisors to list the top three issues they would like addressed to enable mobile learning by clinical supervisors and three issues to enable student use on the other side of the card (5-10 minutes)

Appendix 9

Phase 2 Nursing profession organisation interview information sheet

Mobile learning policy for informal learning and continuing professional development of nurses and midwives at point of care:

Exploring influencing factors on policy development in Australia.

Invitation

You are invited to participate in this study which is exploring the factors that influence the policy development in the area of mobile learning for nurses and midwives in Australia. It has previously been noted that the rapid increase in the use of mobile technology in Australia has outpaced the development of standards, guidelines and policies relating to its use in healthcare settings. Therefore, it is important to gain information from key policy agencies about how to guide and support the safe and appropriate use of mobile technology for informal learning and continuing professional development in the workplace.

This study is being conducted in partial fulfillment of a PhD for Carey Mather under the supervision of Associate Professor Elizabeth Cummings, School of Health Sciences, Faculty of Heath and Associate Professor Fred Gale, School of Social Sciences, Faculty of Arts at the University of Tasmania.

What is the purpose of this study?

This study will explore the factors that have influenced to the current situation where there is a lack of policy in relation to the access and use of mobile technology in healthcare environments

Aim of the study

The aims of the study are to understand the factors that have contributed to the limited use of mobile technology for educational purposes in healthcare settings by nurses and midwives.

The findings will provide direction for the nursing and midwifery profession in developing standards, guidelines and policies to facilitate appropriate and safe use of mobile technology for learning and teaching at point of care (with the patient or client) in healthcare environments.

Why have I been invited to participate?

You have been identified as a representative from your professional organisation that represents nurses and midwives, and may influence nursing and midwifery guidelines, standards or policies.

Participation in the project is voluntary and there are no consequences of deciding not to participate.

5 What will I be asked to do?

You will be asked to answer a series of questions about their organisation's position and policies in relation to nurses and midwives using mobile technology for learning and teaching.

The researcher will interview you by telephone at a time that is convenient to you. The interview may take between 20-40 minutes to complete, and will be recorded. You will be offered the opportunity to review and correct a transcript of their interview to validate what they stated at interview is correct.

Are there any possible benefits from participation in this study?

Potential benefits are the improvement of learning and teaching and increased access to learning and teaching tools.

Are there any possible risks from participation in this study?

No risks have been identified from participation in this study.

What if I change my mind during or after the study?

You can withdraw at any time and can do so without providing an explanation and your data can be removed from the study prior to analysis commencing on 30 November 2016.

What will happen to the information when this study is over?

Data will be stored electronically within the School of Health Sciences information communication network. It will be password protected and destroyed by deletion in 2021.

How will the results of the study be published?

Study findings will be disseminated through appropriate national or international nursing and informatics networks. Only pooled data will be used and participants will not be identifiable in the publication of the results.

What if I have questions about this study?

If you have any queries or would like clarification about this study, please contact:

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This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study, please contact the Executive Officer of the HREC (Tasmania) Network on +61 3 6226 6254 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. Please quote ethics reference number H0016097

This information sheet is for you to keep.

Appendix 10

Phase 2 Nursing profession organisation interview schedule

Mobile learning policy for informal learning and continuing professional development of nurses and midwives at point of care:

Exploring influencing factors on policy development in Australia.

Interview schedule for representatives from professional organisations that represent nurses and/or midwives

Project Aims:

To explore what standards, guidelines and policies have influenced the development of mobile learning at point of care by nurses and midwives in Australia.

To understand the systems factors that have contributed to the current situation of mobile learning in healthcare environments.

Schedule Aim: Investigate experiences and perceptions from the representatives of organisations about using mobile technology for informal learning and CPD of nurses and/or midwives in the workplace.

Overview of organisations' position on mobile technology for mobile learning

Key Questions	**Funneling Question**
1. Can you tell me about the overall view of this organisation's position on nurses and midwives using mobile technology for informal learning and CPD in the workplace?	
2. If your organisation has a position on mobile technology use for mobile learning, please provide detail about how this position was developed?	a. History b. Process undertaken c. Documents used
3. If your organisation has no position on mobile technology use for mobile learning, what do you think this organisation could offer in order to influence the use of mobile technology for informal learning and CPD in the workplace?	a. Positives b. Negatives
4. Can you tell me what your organisation can do to support the development of standards, guidelines or policies about the access and use of mobile technology at point of care?	a. Positives b. Negatives

Mobile technology and learning

5. Now I'd like to move on to talk about the potential of learning using portable or mobile technology in the workplace. Can you explain to me in your own words how portable or mobile technology could change learning in the workplace?

6. Can you tell me about how your organisation's opinion on access to portable or mobile learning environments impact on patient or client safety?

a. Positives

b. Negatives

7. Can you tell me about your organisation's opinion on perceptions of public about nurses and/or midwives using portable or mobile technology in the workplace?

a. Positives

b. Negatives

8. Do you have any opinion on perceptions of other health professionals using portable or mobile technology in the workplace?

a. Positives

b. Negatives

Continuing professional development

9. To finish up I want to ask a question about nurses or midwives using mobile technology for informal learning or continuing professional development more broadly.

a. If they use web-based resources can you give examples of what you know can be accessed or used?

What do you perceive nurses or midwives currently do for continuing professional development to meet the requirements for AHPRA?

b. What is your opinion of using mobile learning to achieve some of the CPD requirements?

10. Do You have any other comments you would like to make regarding nurses using mobile technology for learning?

Thank you for your time, your insights, and your ideas about using portable or mobile technology in the workplace.